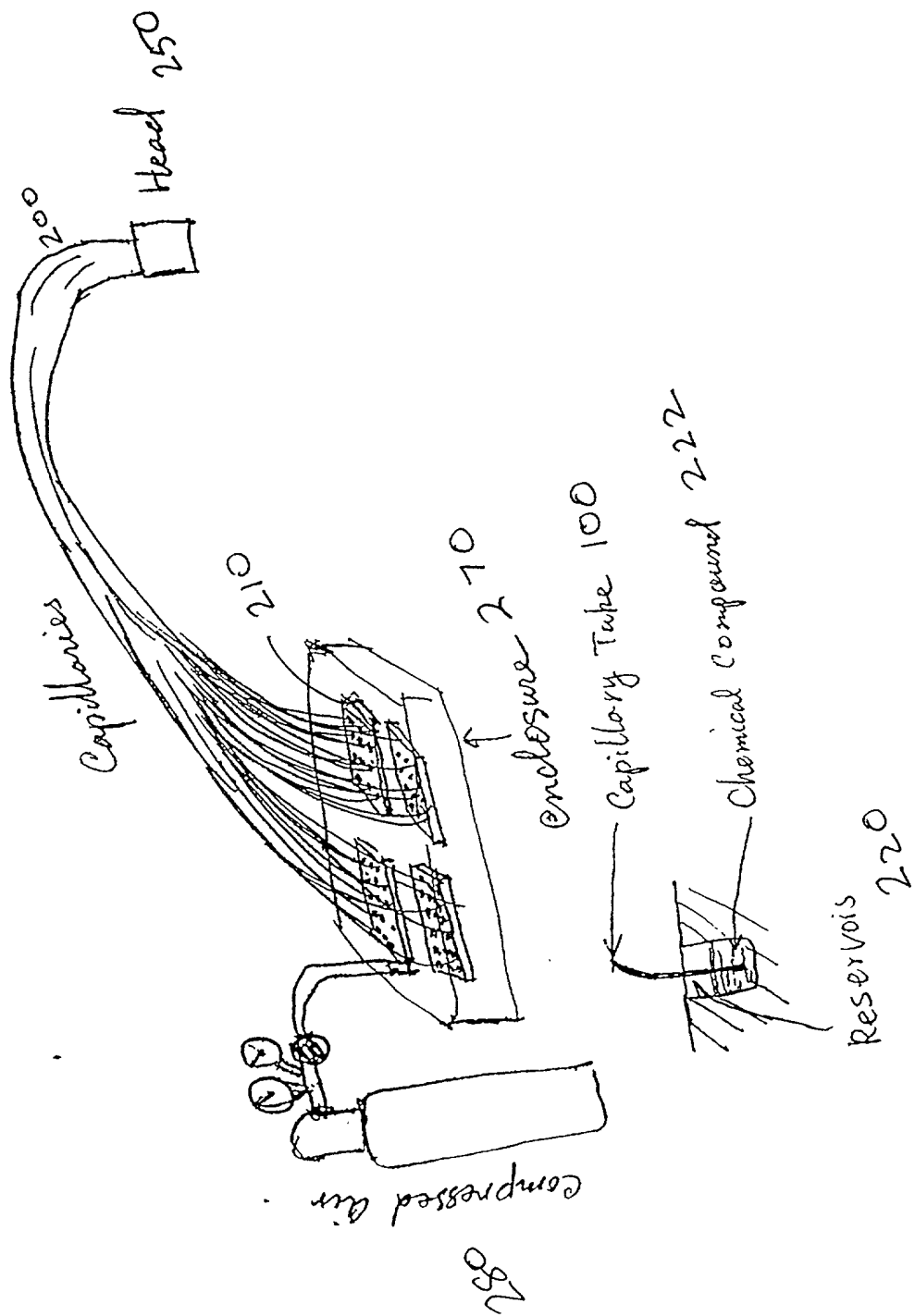


Figure 1

Fig. 2A



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# XHTS

-- Microarrays and Fiber Bundles

Imaging

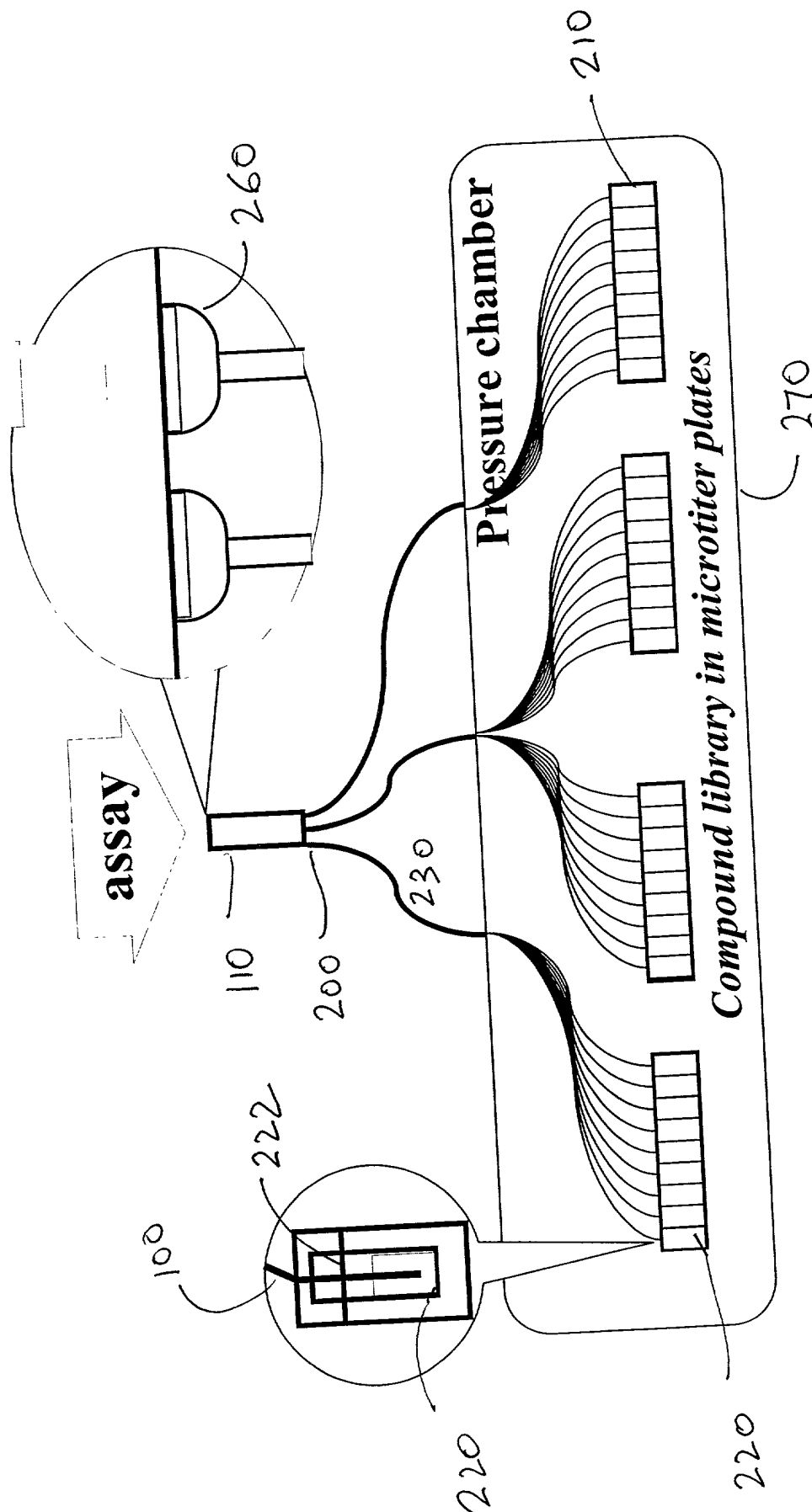


FIG. 2B

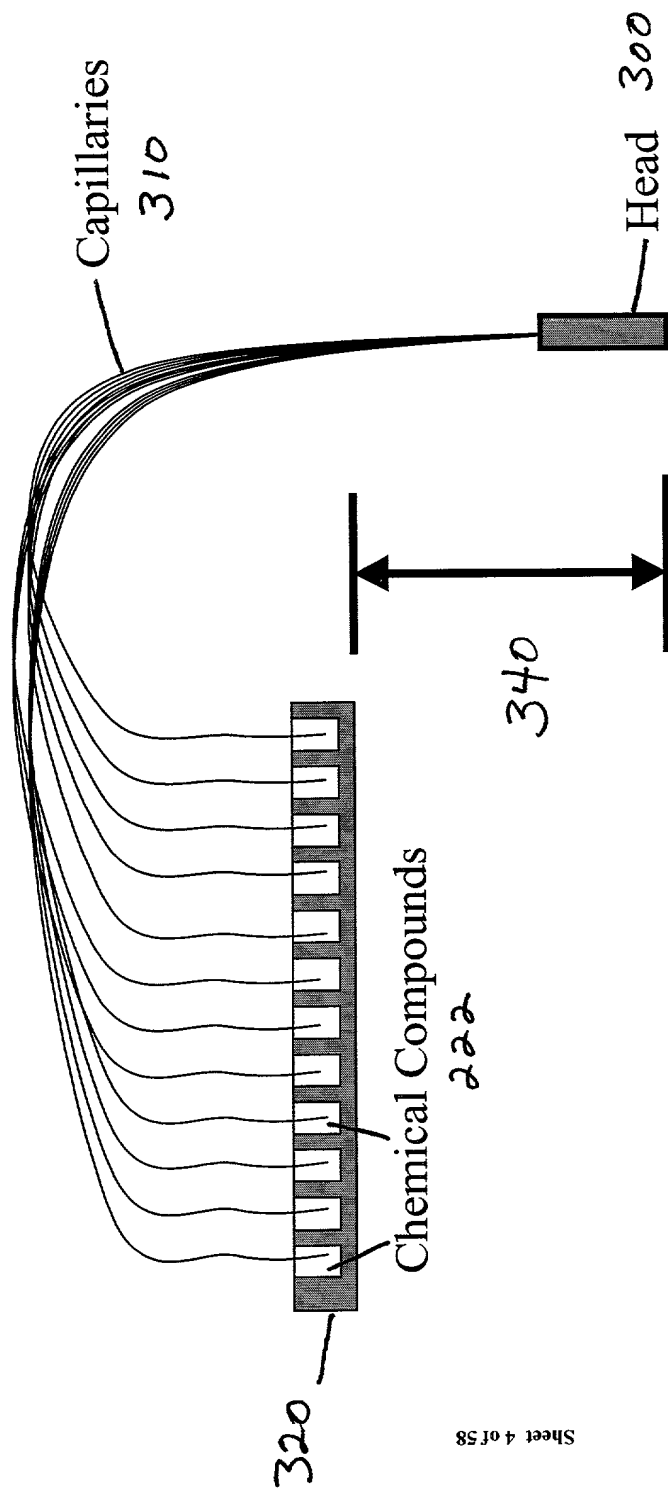
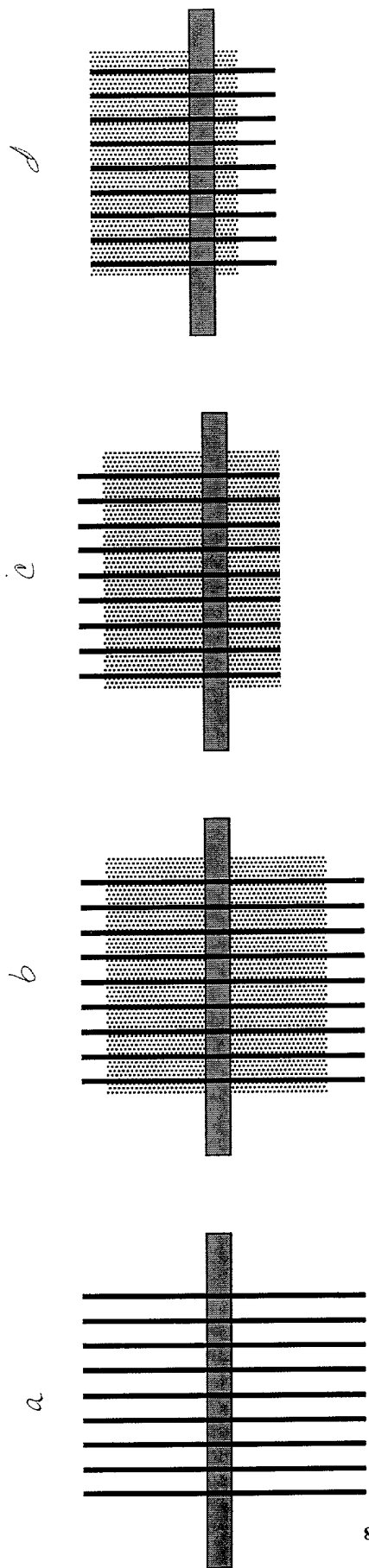


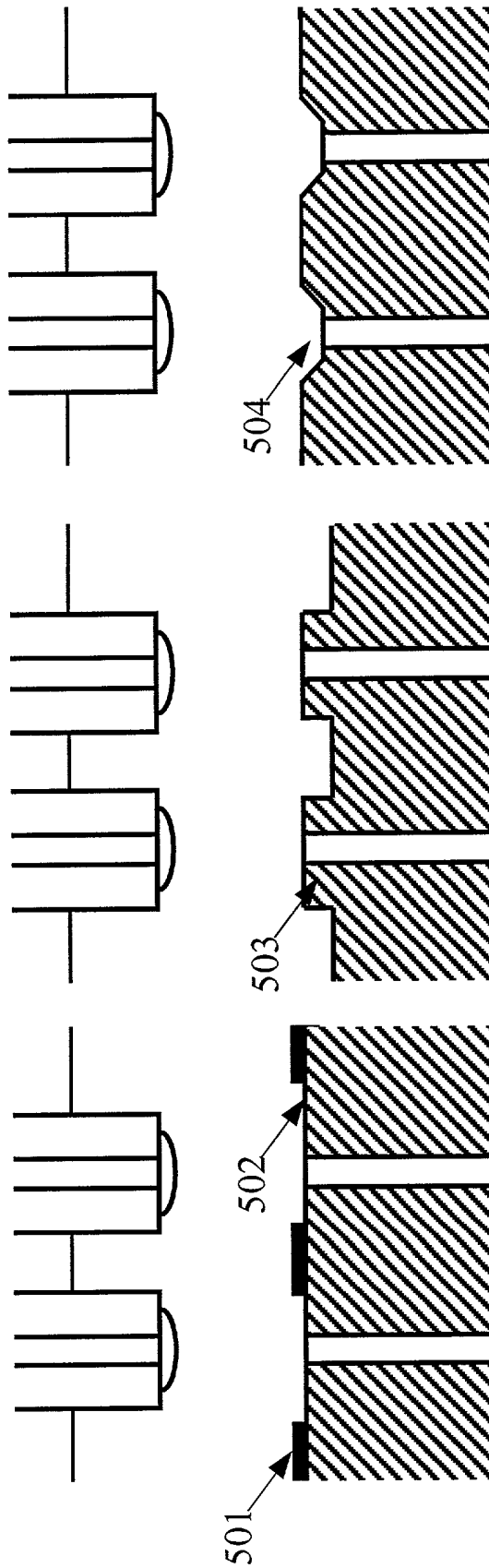
Figure 3



Sheet 5 of 58

Fig. 4. Fabrication of delivery head using a guide plate

Delivery head



(a)

(b)

(c)

Capillary array compound library

- 501 – Hydrophobic coating
- 502 – Hydrophilic coating
- 503 – Island
- 504 - Well

Fig. 5. Surface features on the surface of the capillary array compound library to prevent cross-contamination during compound loading

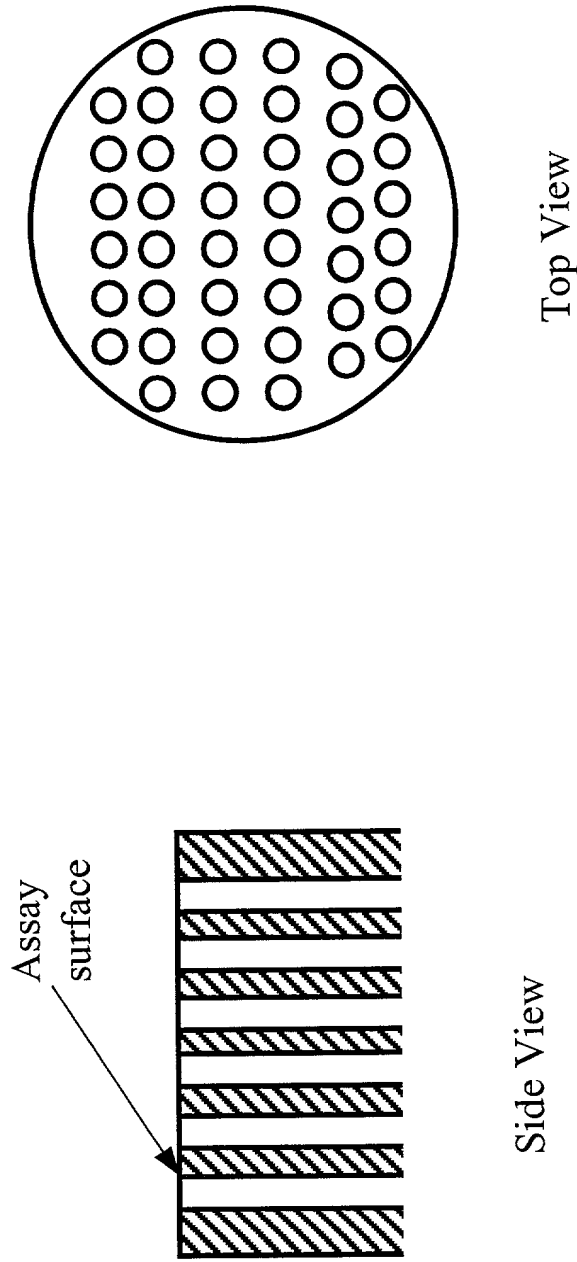


Fig. 6. Basic configuration of capillary array substrate for the portable compound library

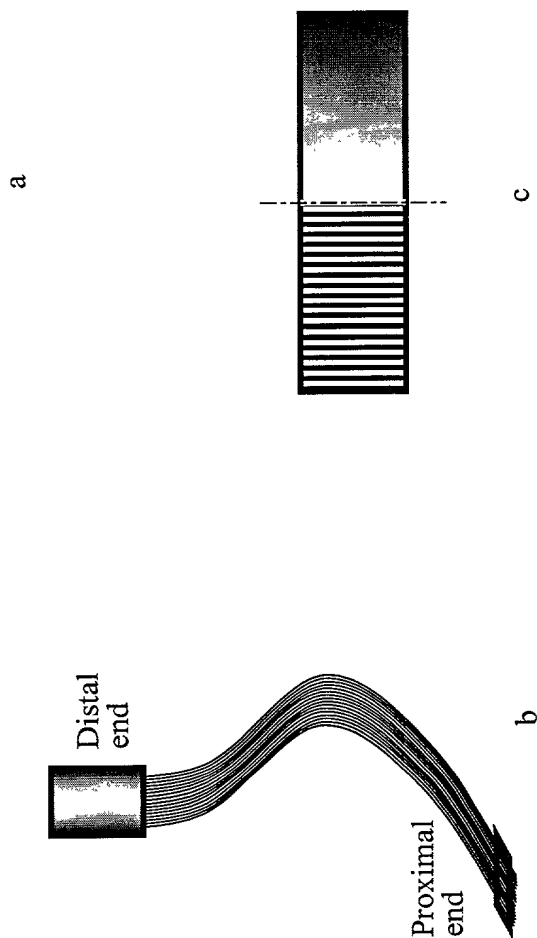
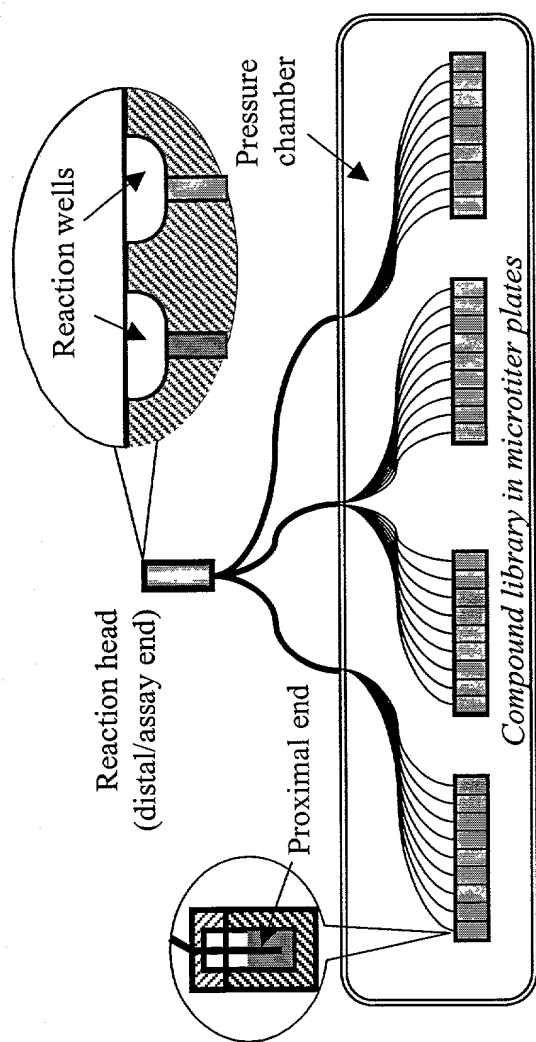
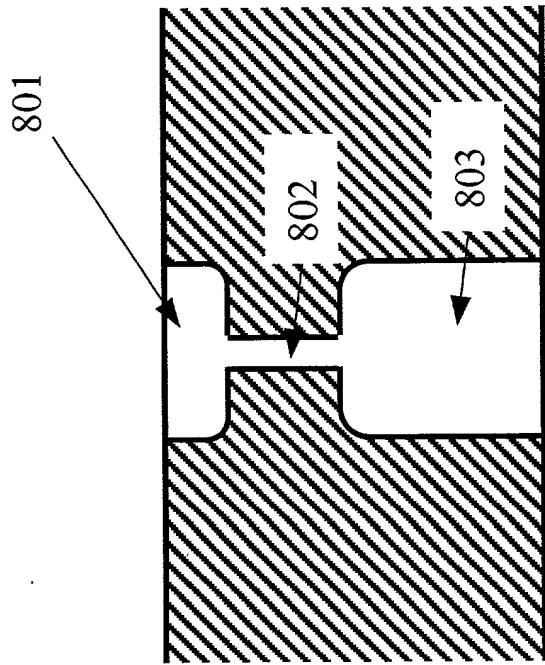


Fig. 7 The capillary array compound library in different formats



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- 801 – Mixing/reaction well
- 802 – Flow regulator for reagent metering
- 803 – Compound reservoir

Fig. 8. Internal structure of a through hole in capillary array compound library

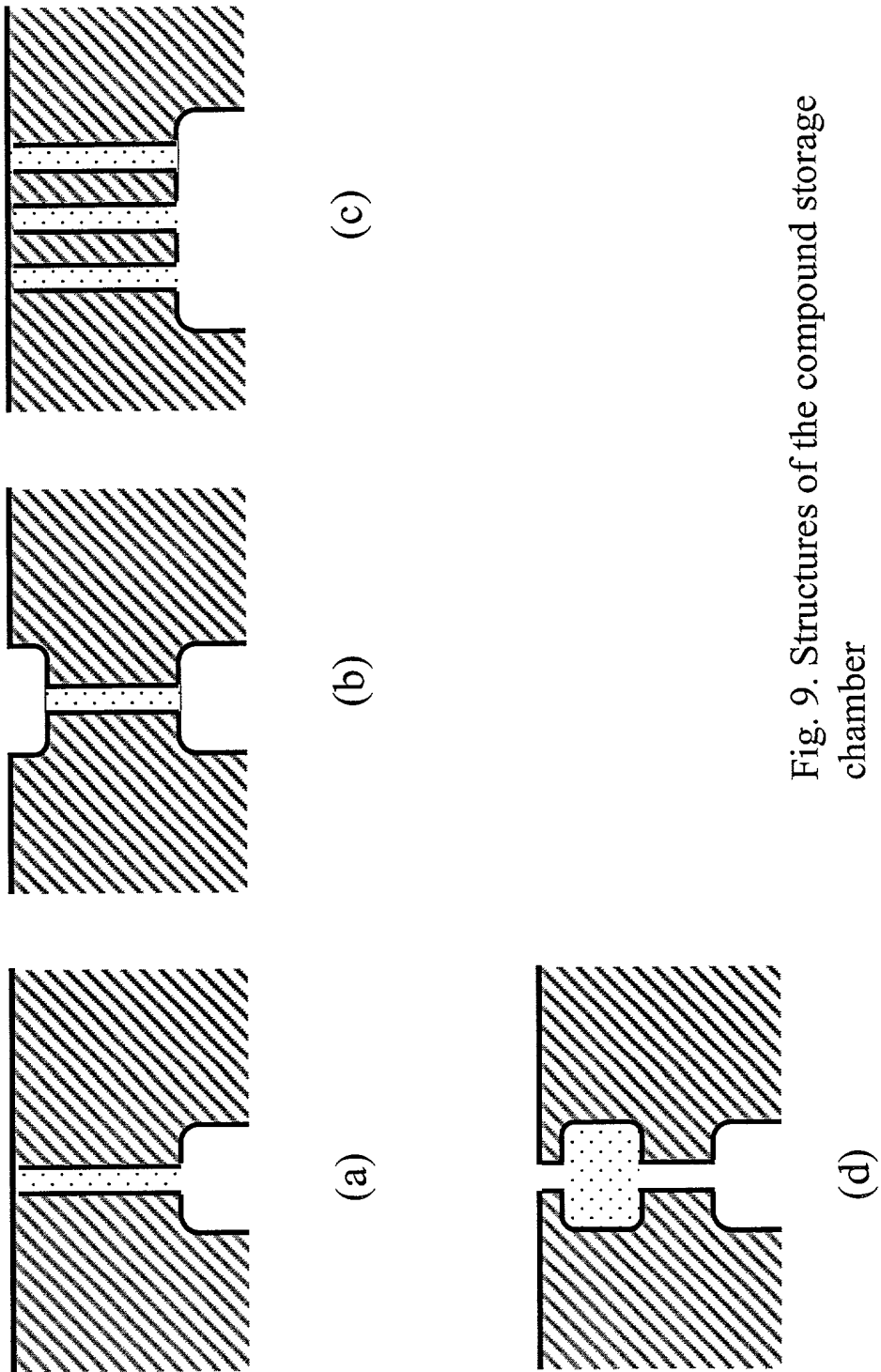


Fig. 9. Structures of the compound storage chamber

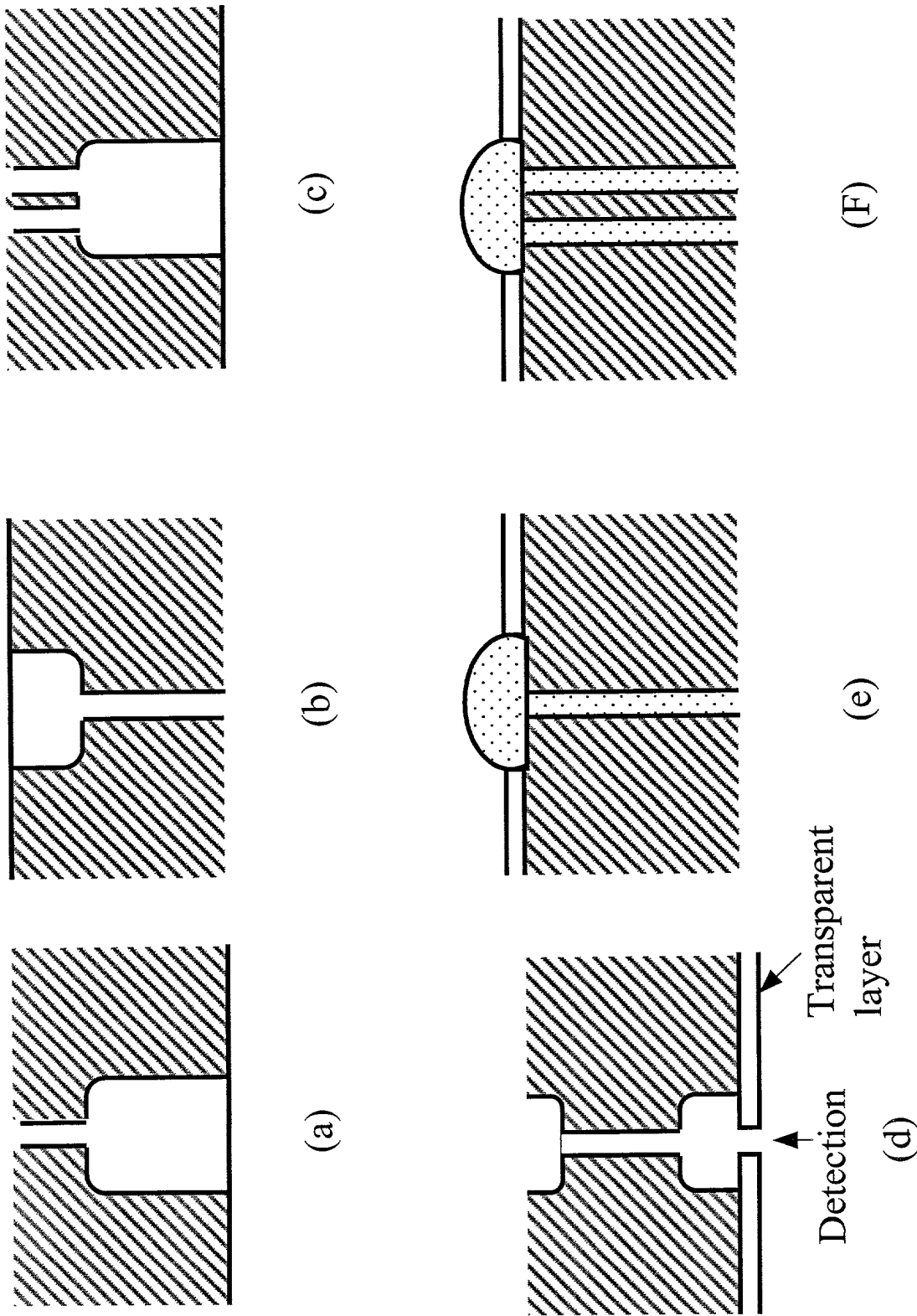
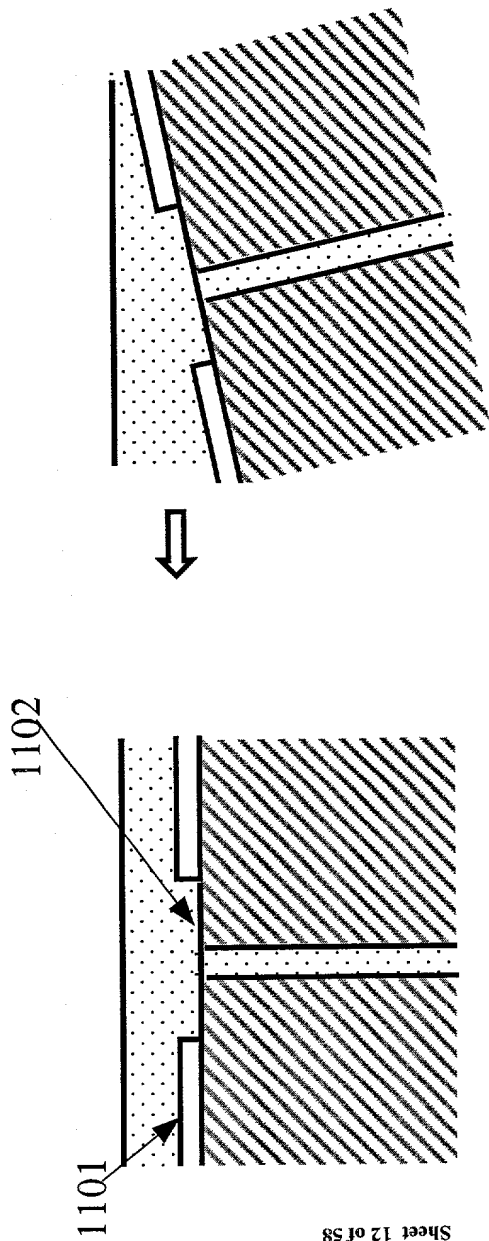
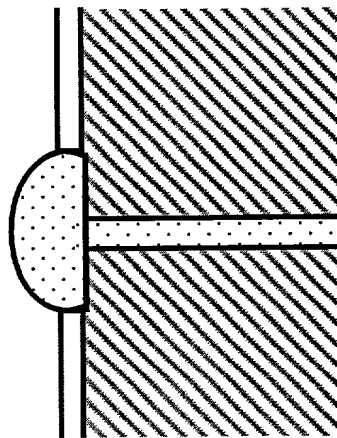


Fig. 10. Internal structures of mixing/reaction chamber



(a)

(b)



(c)

1101 – Hydrophobic coating  
1102 – Hydrophilic coating

Fig. 11. Volume metering by surface tension patch

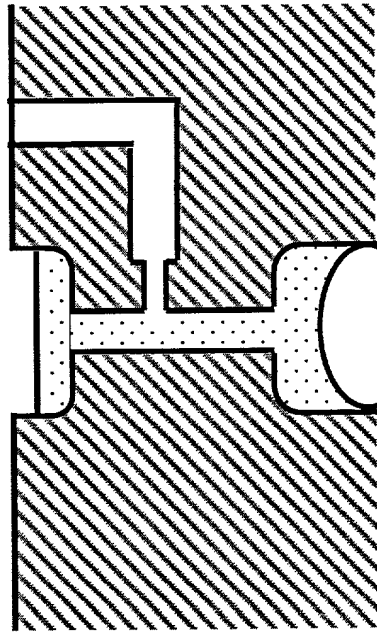


Fig. 12. Fluid regulator with side air tunnel

Fig. 13 Internal through hole structures to facilitate chamber volume metering and mixing

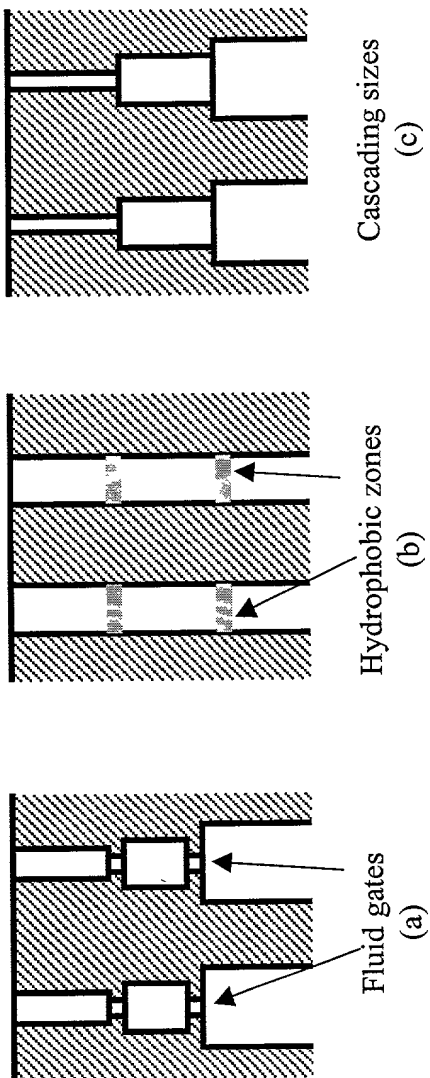


Fig. 14 Process of metering multiple reagents using interconnected chambers

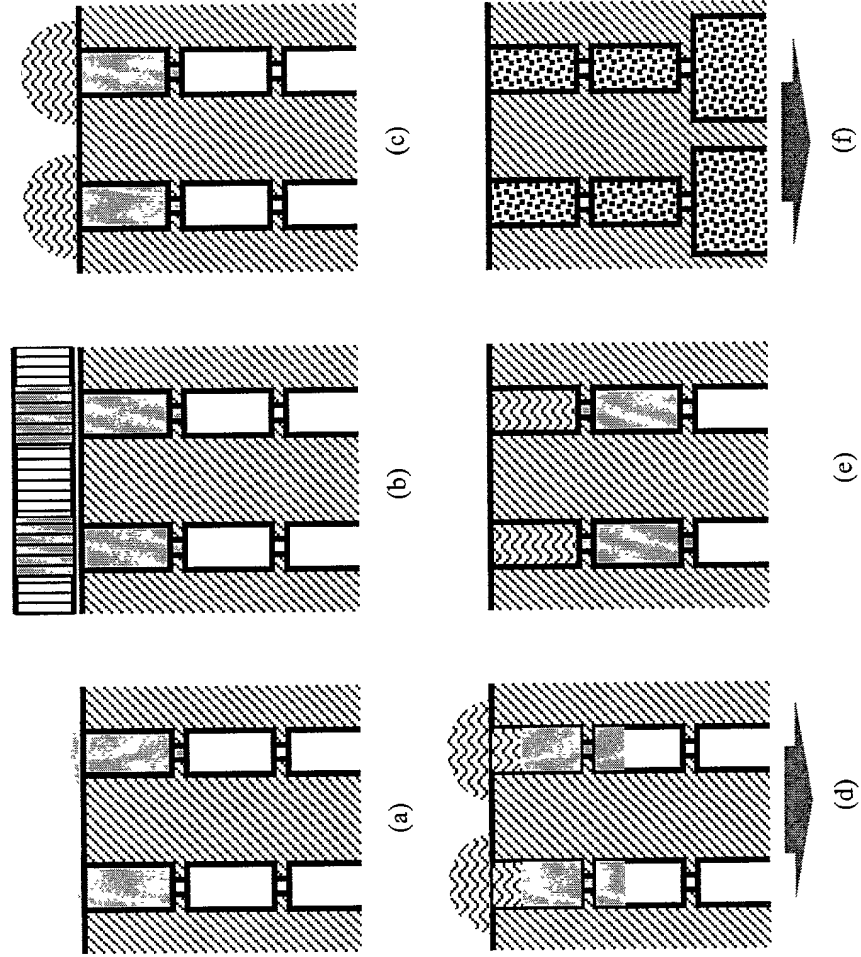
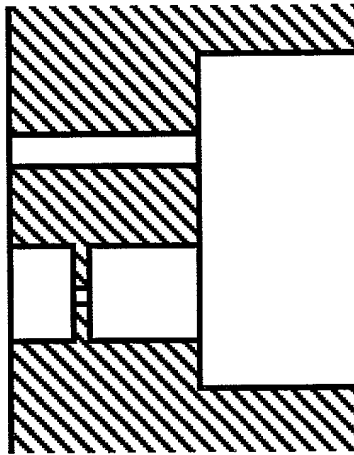


Fig. 15 Special through hole structure where multiple chambers links to a chamber in parallel





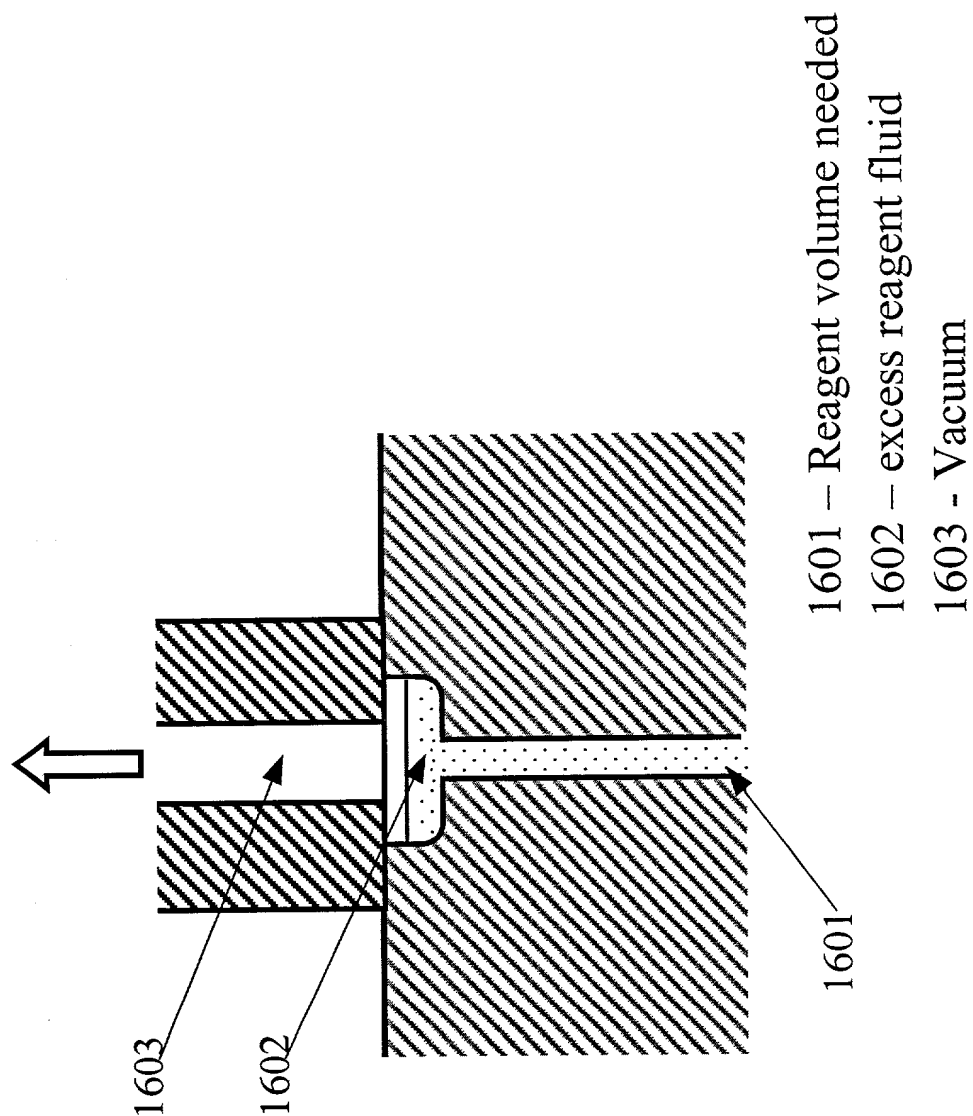


Fig.16. Removal of excess fluid by vacuum

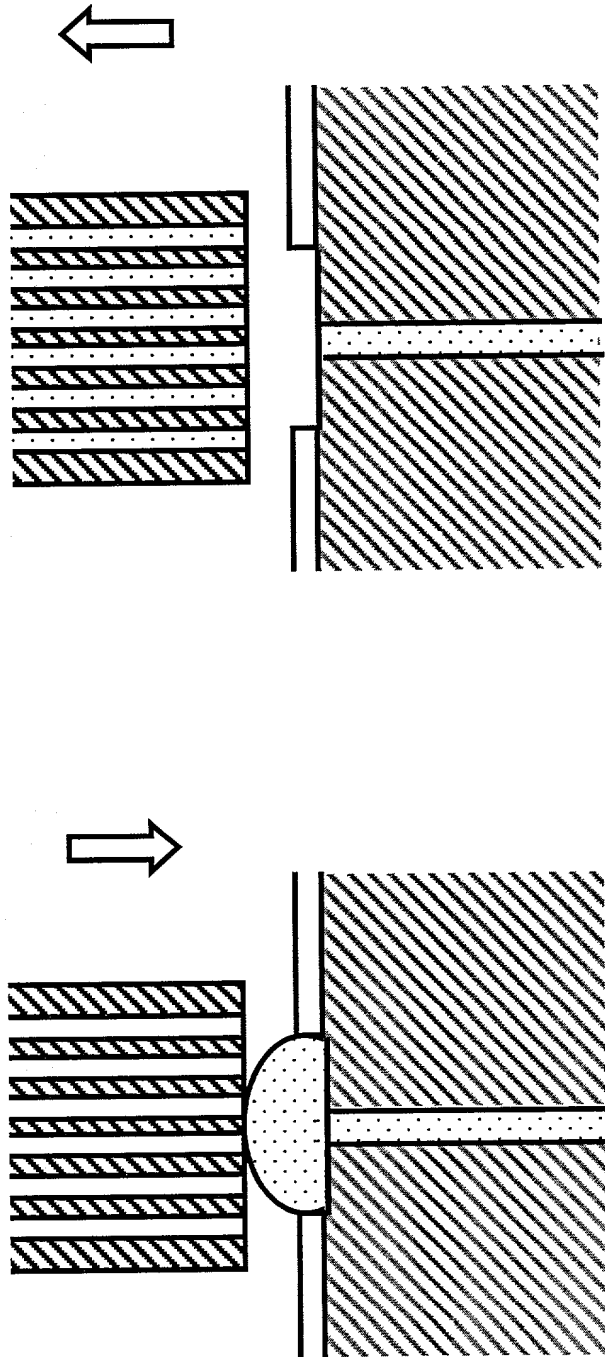
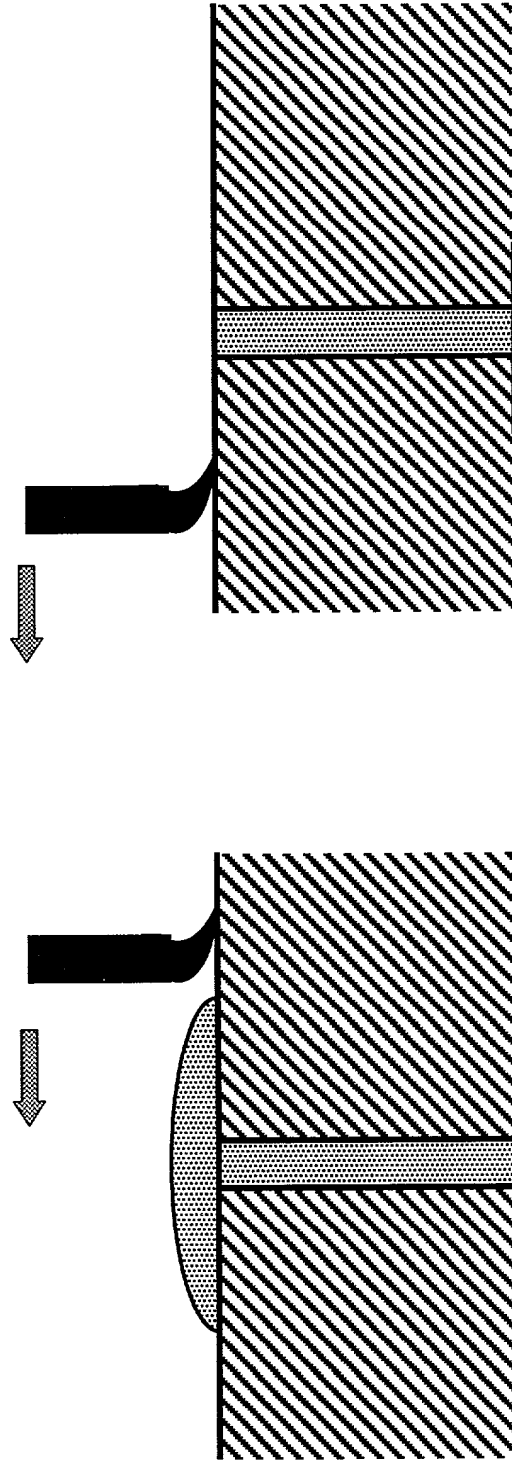


Fig. 17. Excess fluid removal using a second capillary array

206120" 4/2000T

**Fig. 18. Excess Fluid Removal by Wiping**



a

b

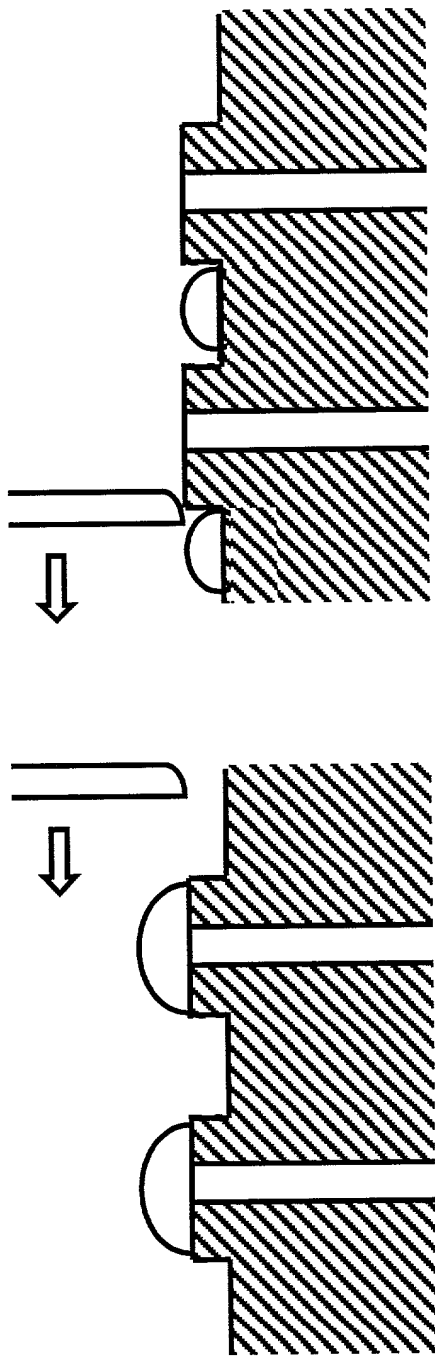
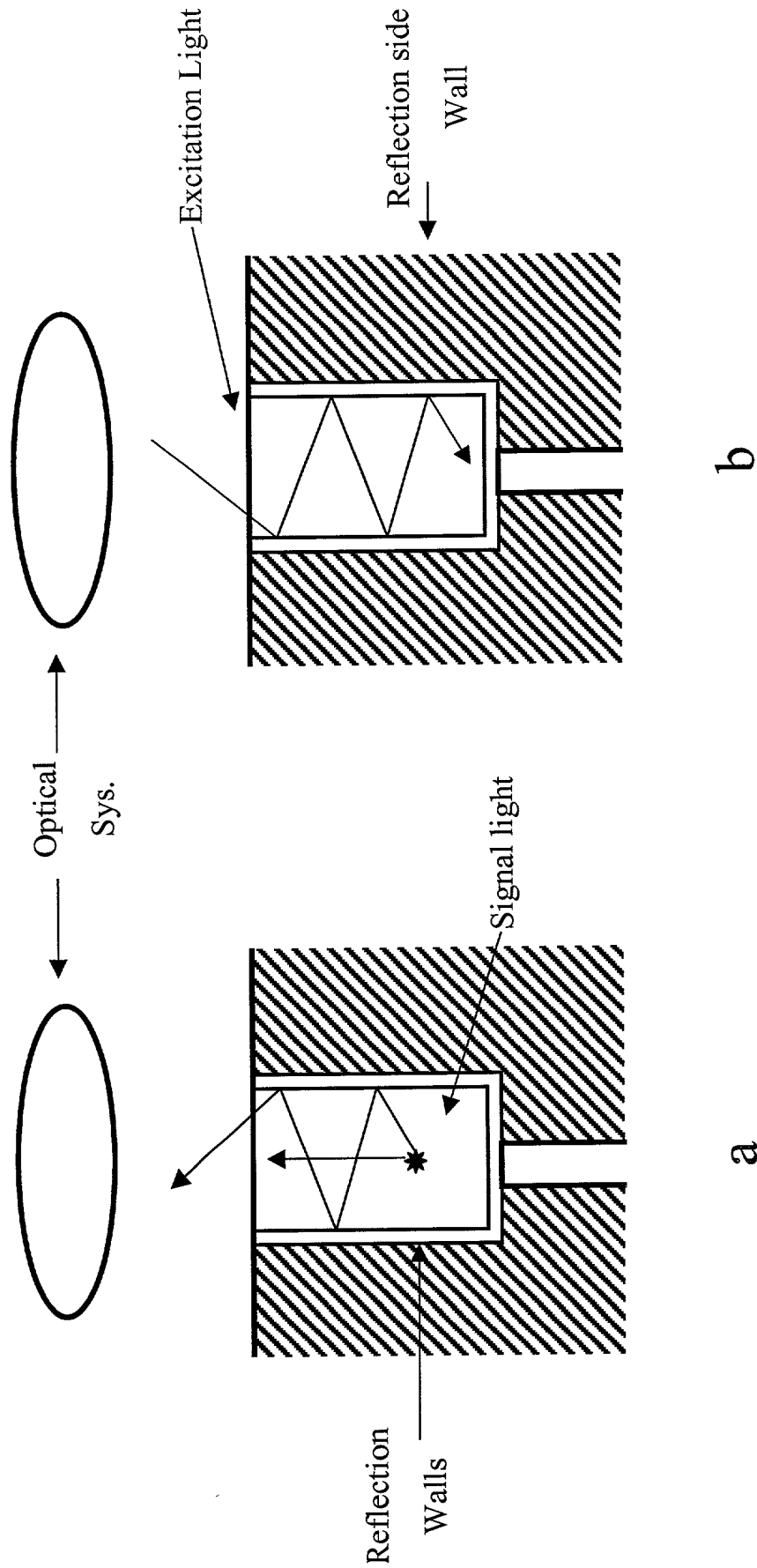


Fig.19. A method for reducing cross-contamination between adjacent holes during excess fluid removal

Fig. 20 Use Reflection Wall of Reaction Chamber to Enhance Optical  
 Signal of the Assay



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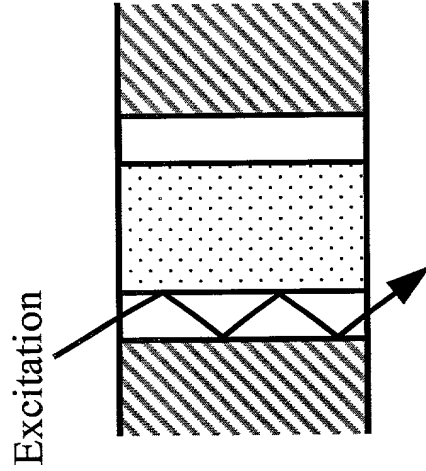
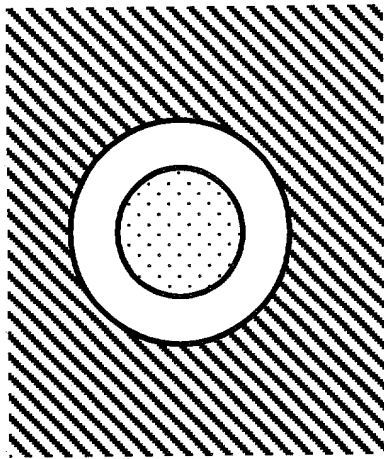
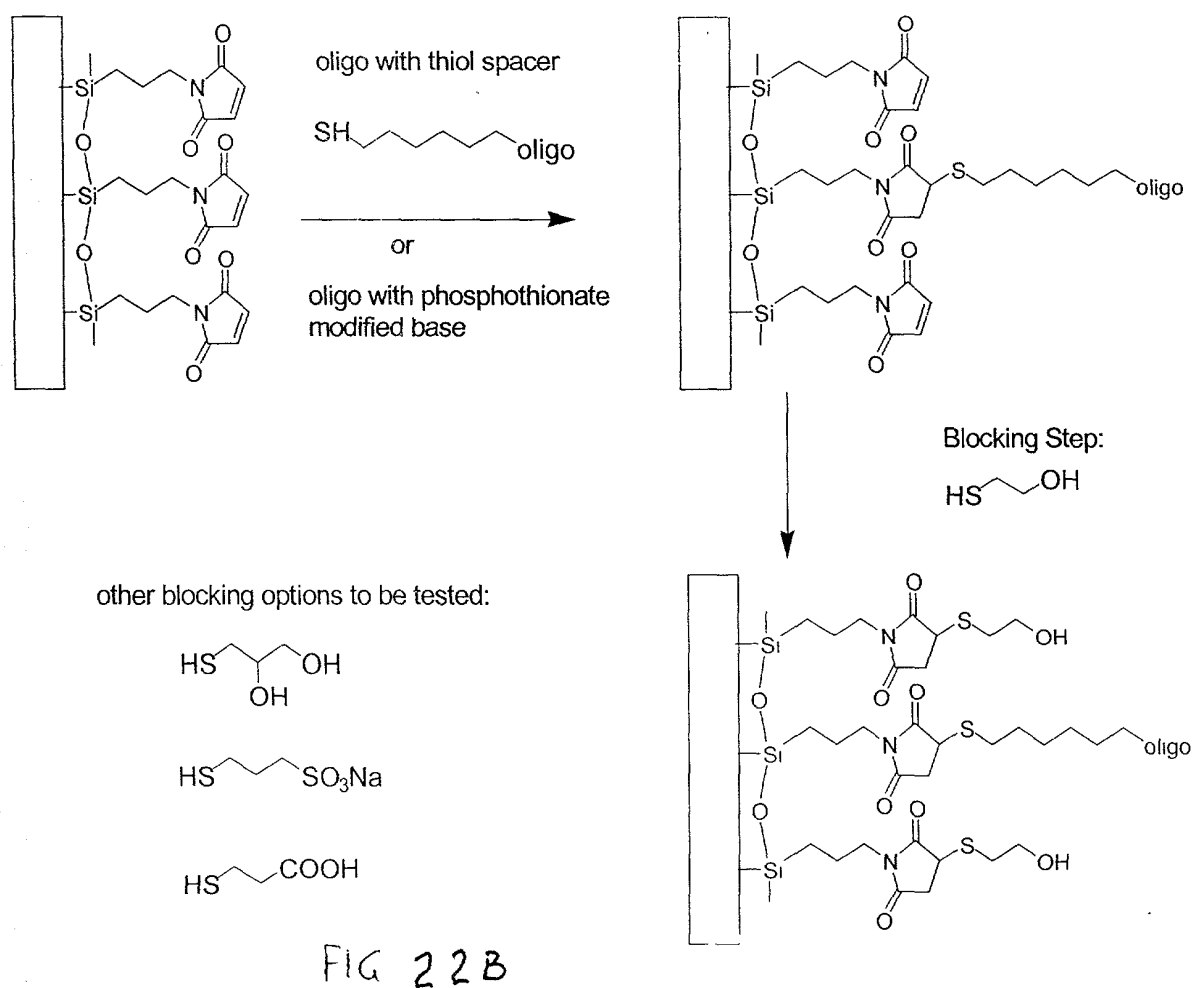
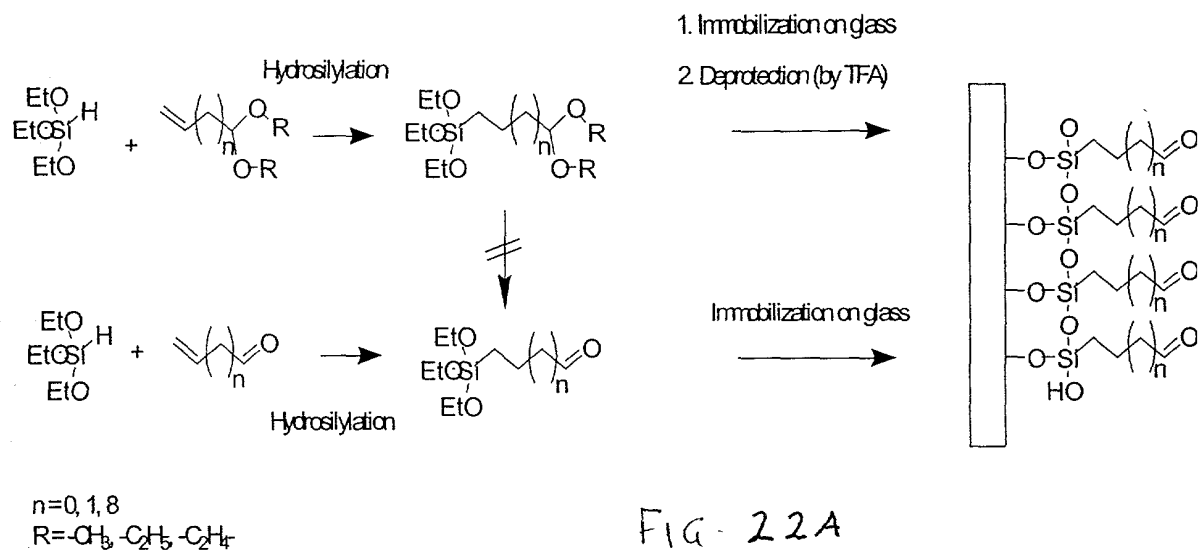


Fig21 Light guiding capillary



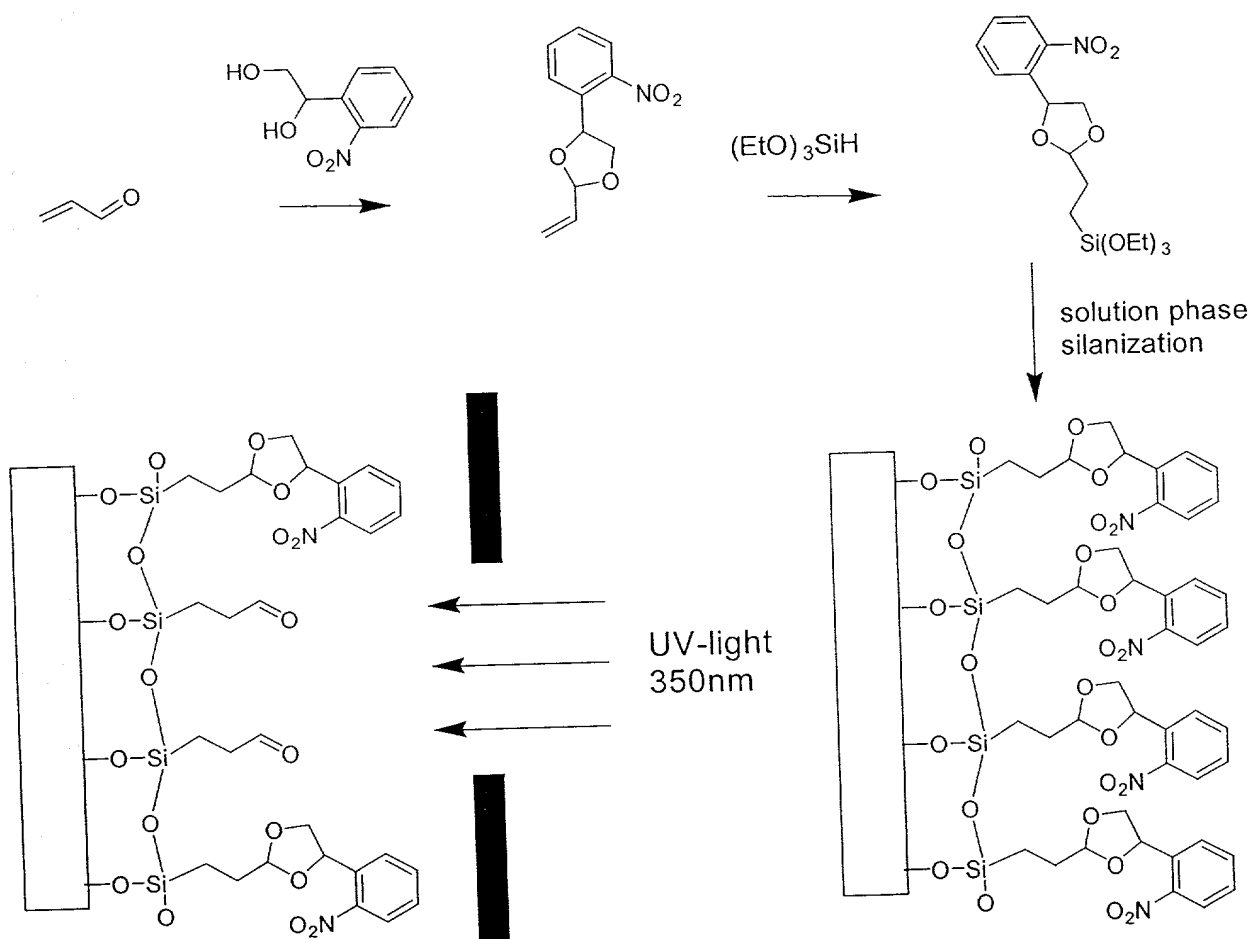
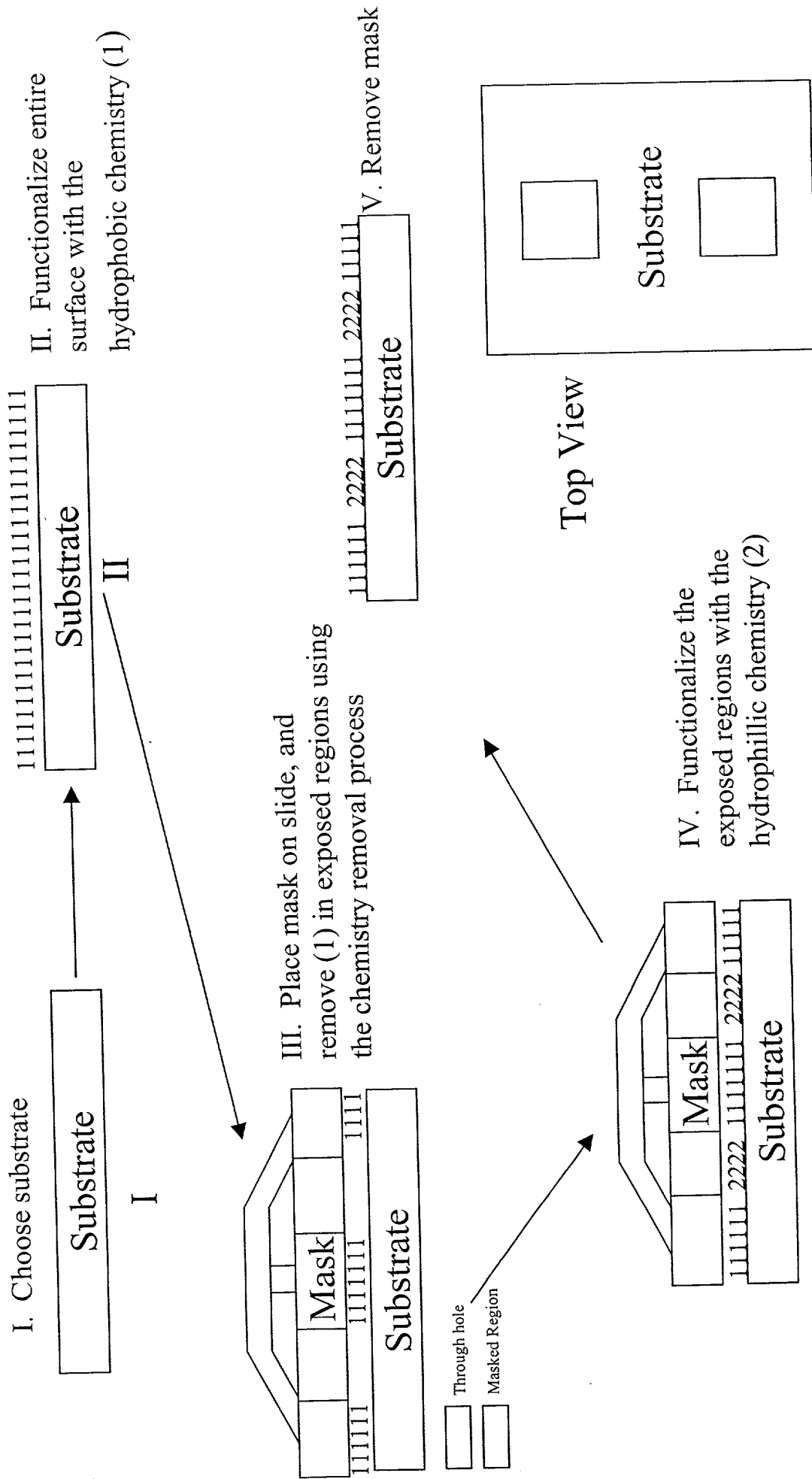


FIG. 22C



# Figure 23 Process for fabrication using a negative mask



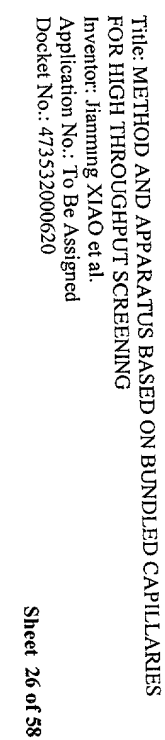
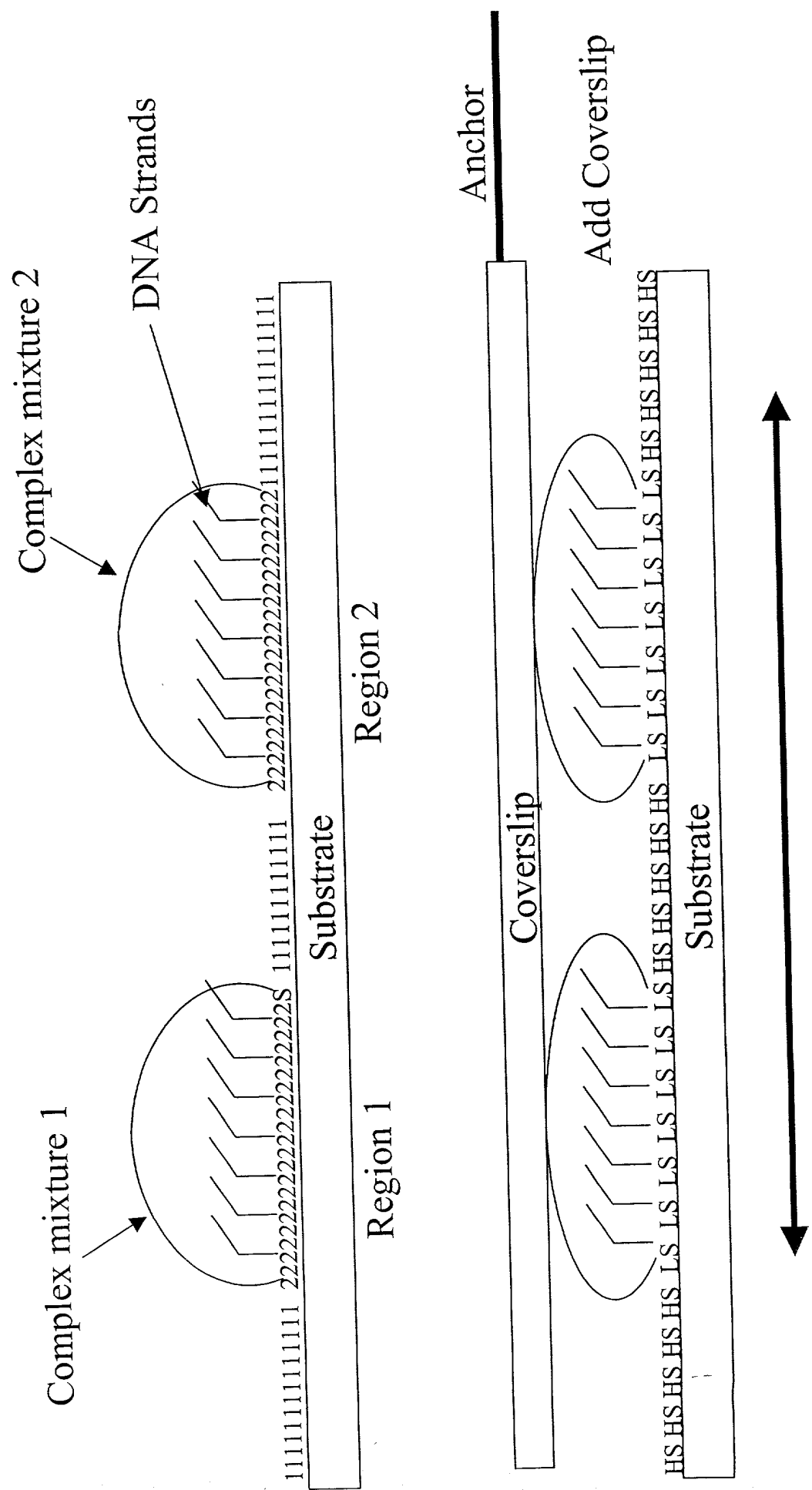
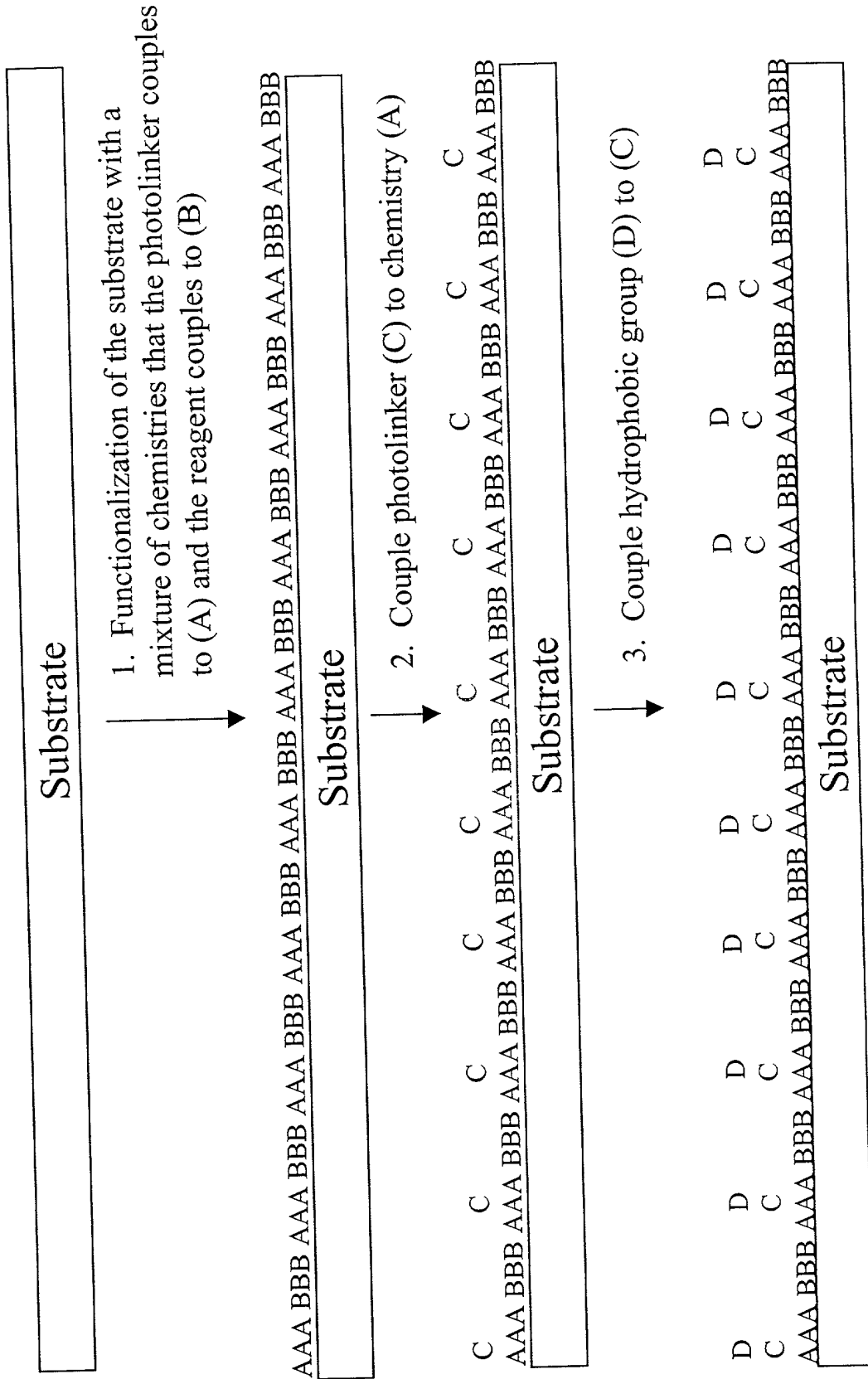
[illegible]

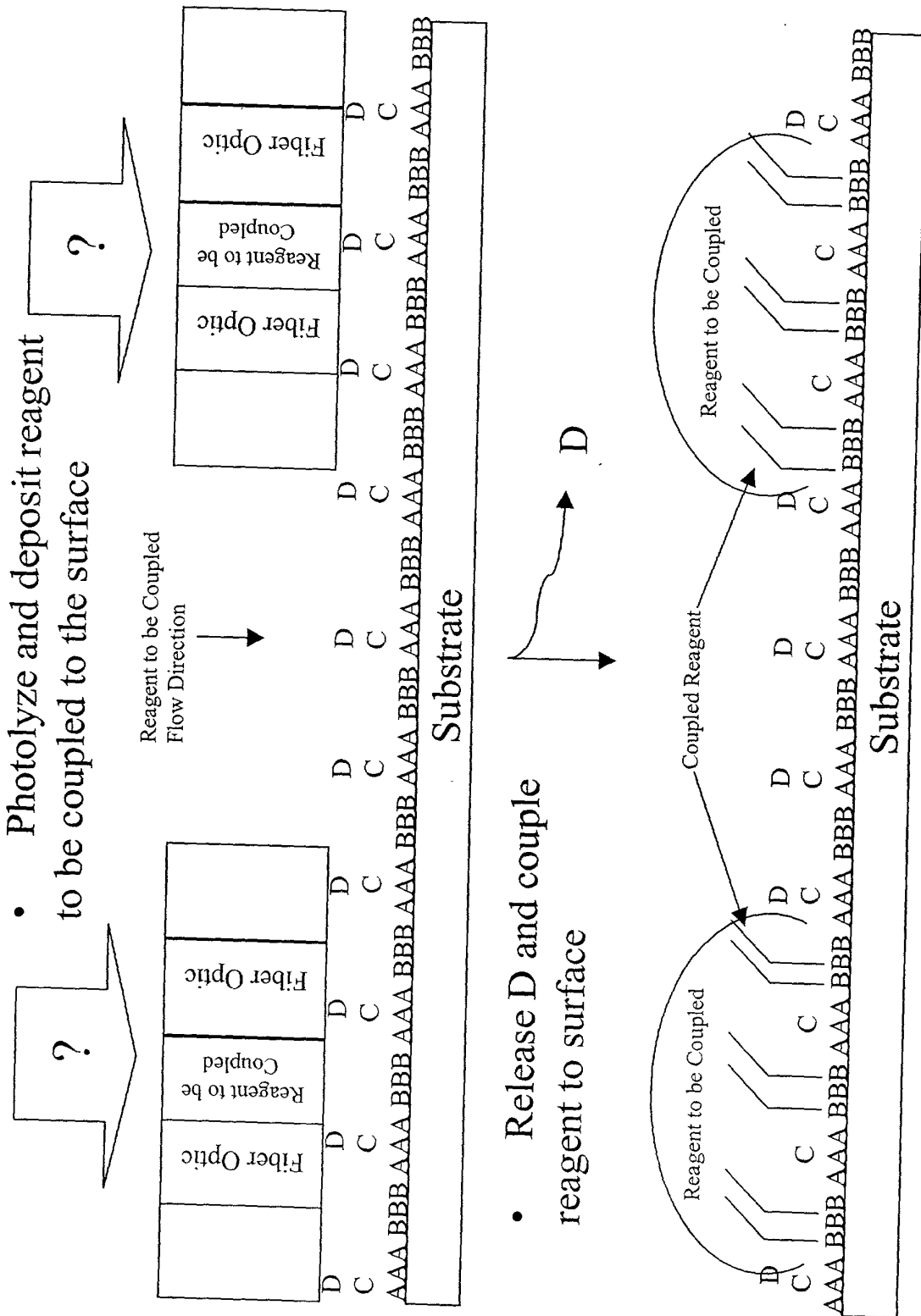
Figure 25 Chamber use



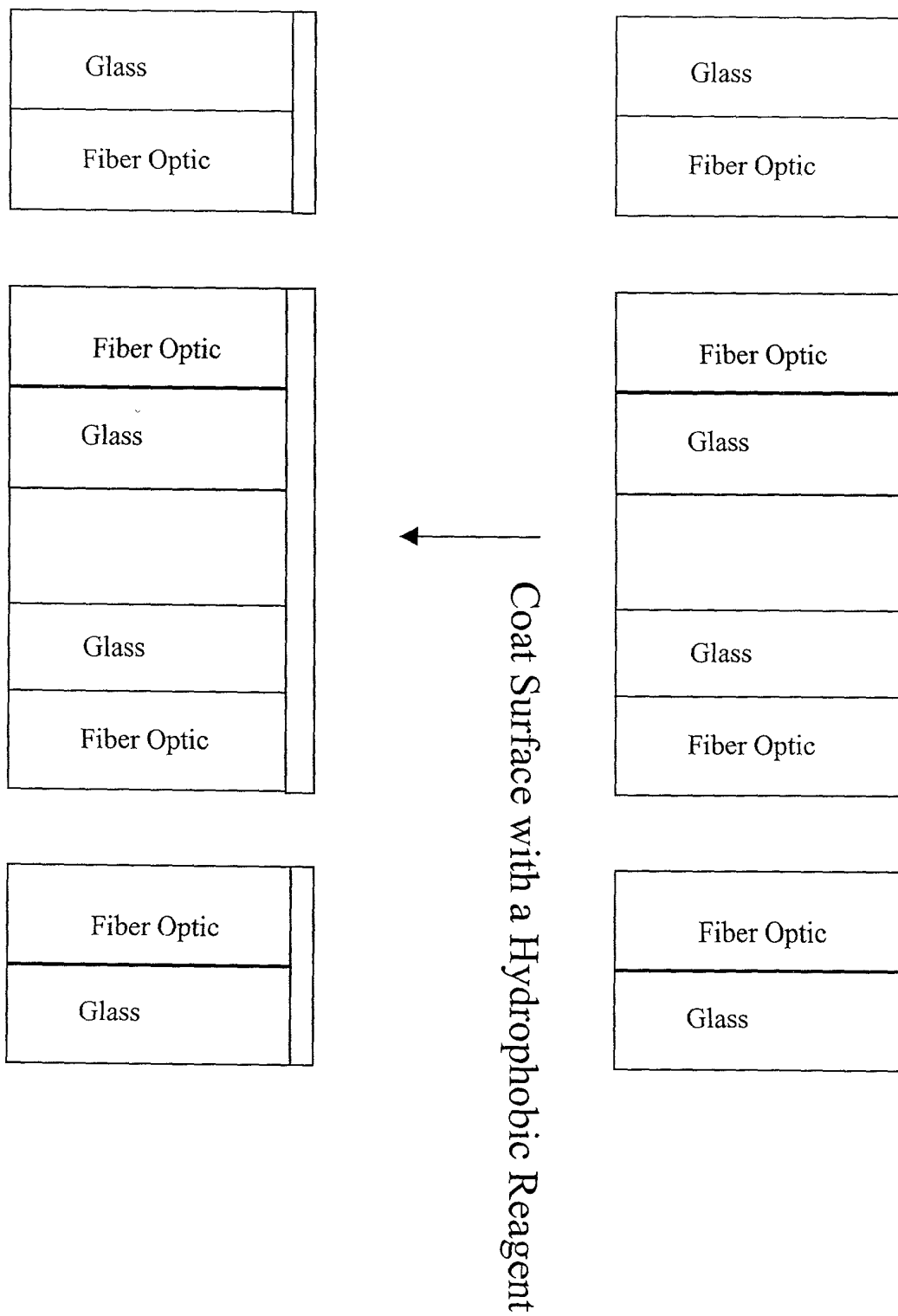
**Figure 26A Surface Tension Patterning: On-capillary Fiber optic based patterning**



# Figure 26B Surface Tension Patterning: On-capillary Fiber optic based patterning



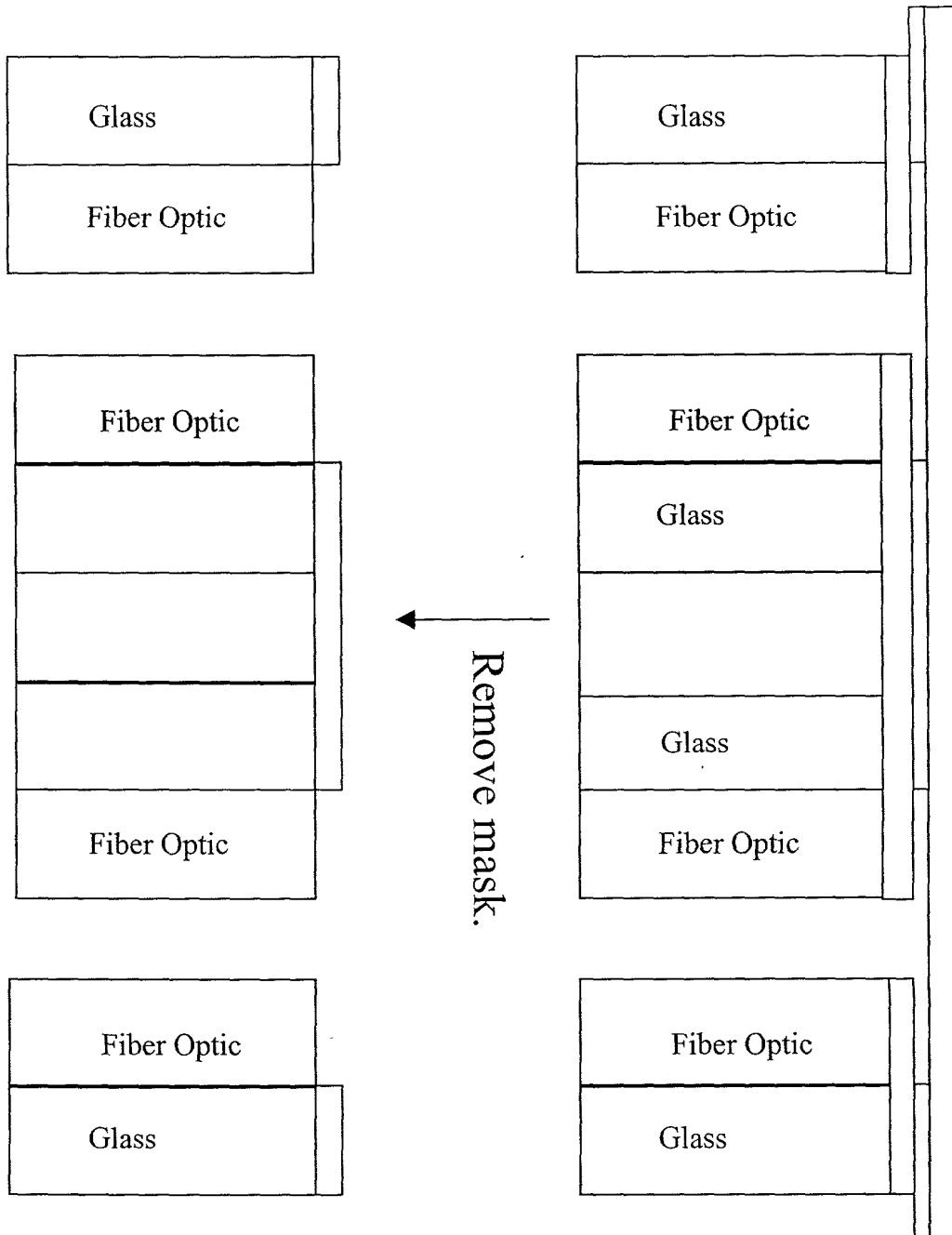
**Figure 27A** Volume Metering using Surface Tension Features



10080374.031502

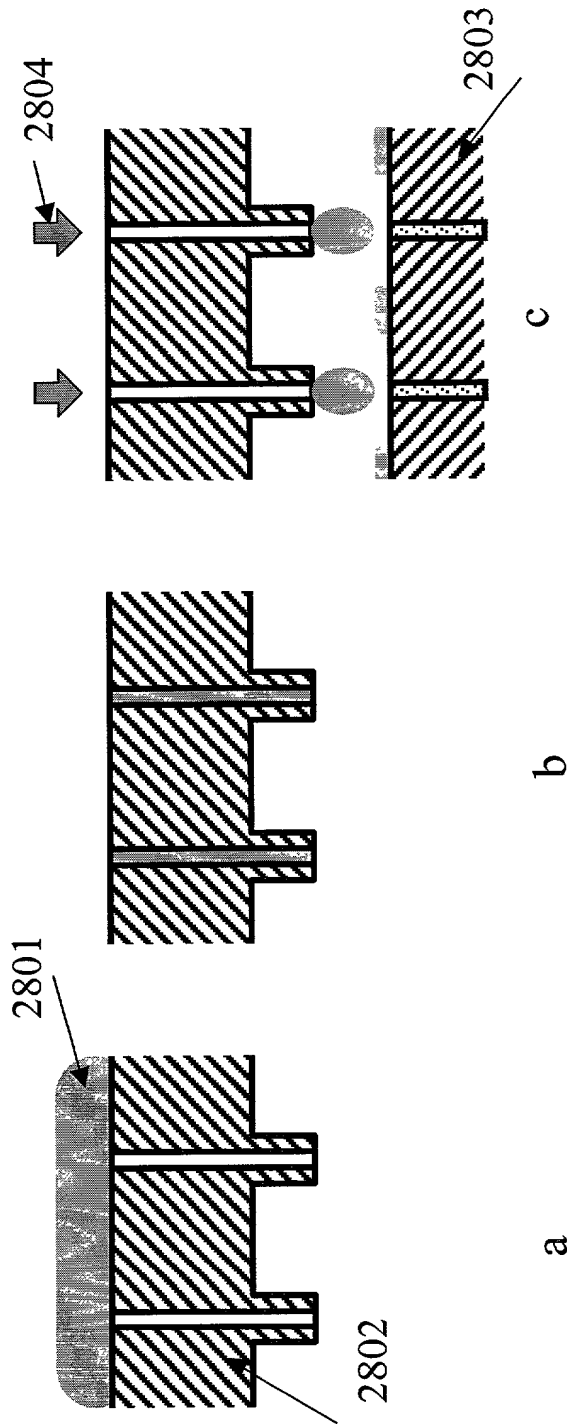
**Figure 27B Volume Metering using Surface Tension Features**

Place a Mask on to the Surface and Expose the Surface to the Chemistry Removal Process



10080274.021902

Fig. 28 Reagent pre-metering using an intermediary through-hole array



2801 - reagent fluid applied in excessive;  
2802 - intermediary through hole array;  
2803 - capillary array compound library;  
2804 - pressure



Fig. 29 Metering and mixing with a multi-use capillary array  
compound library

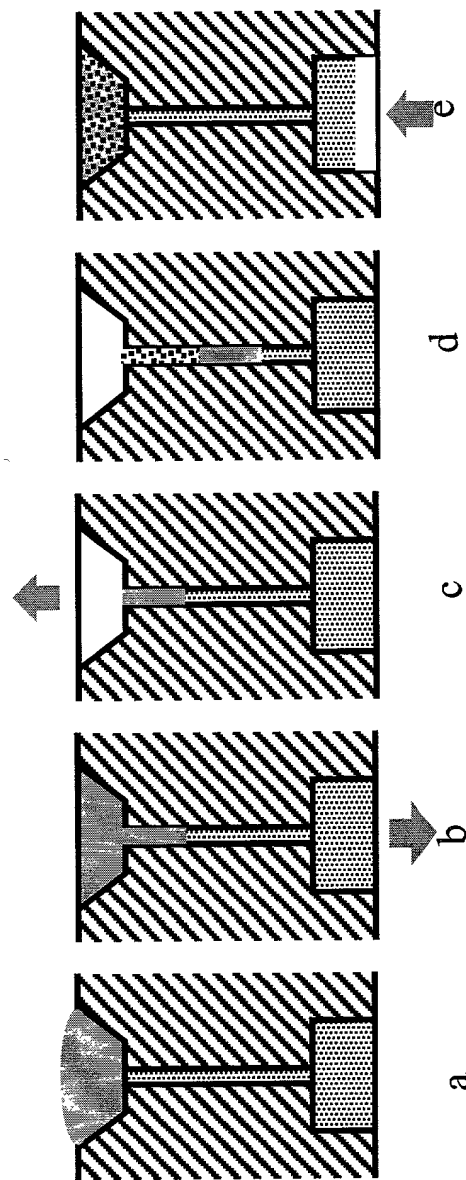


Fig. 30 Metering with hydrophilic patch and mixing

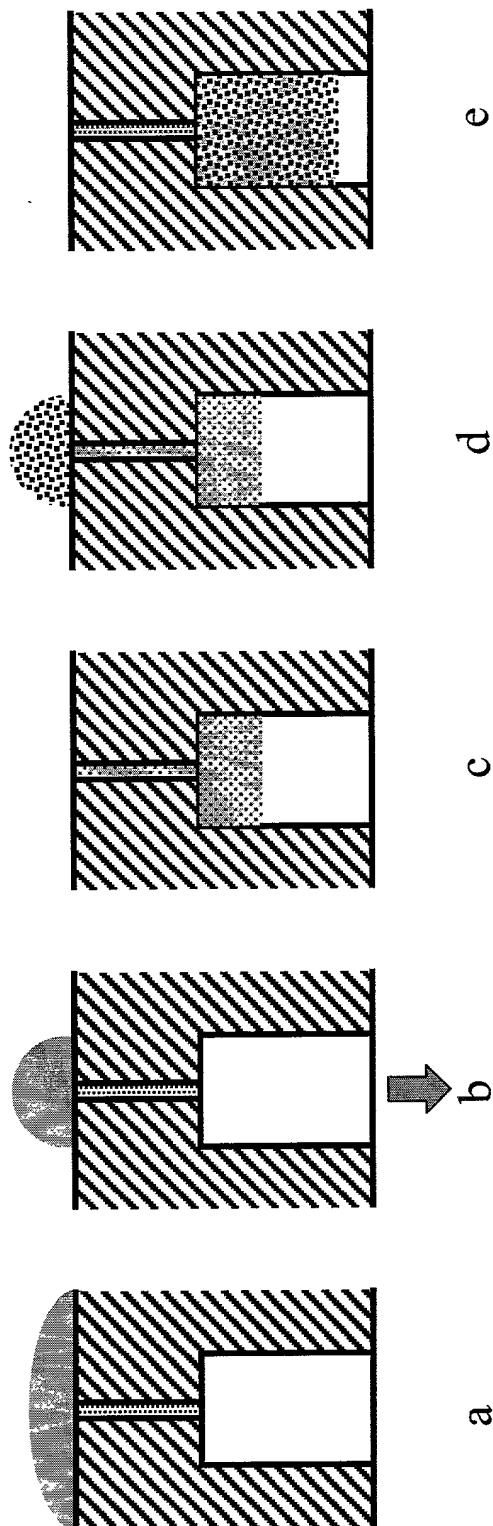


Fig. 31 Mixing and metering with interconnected chambers

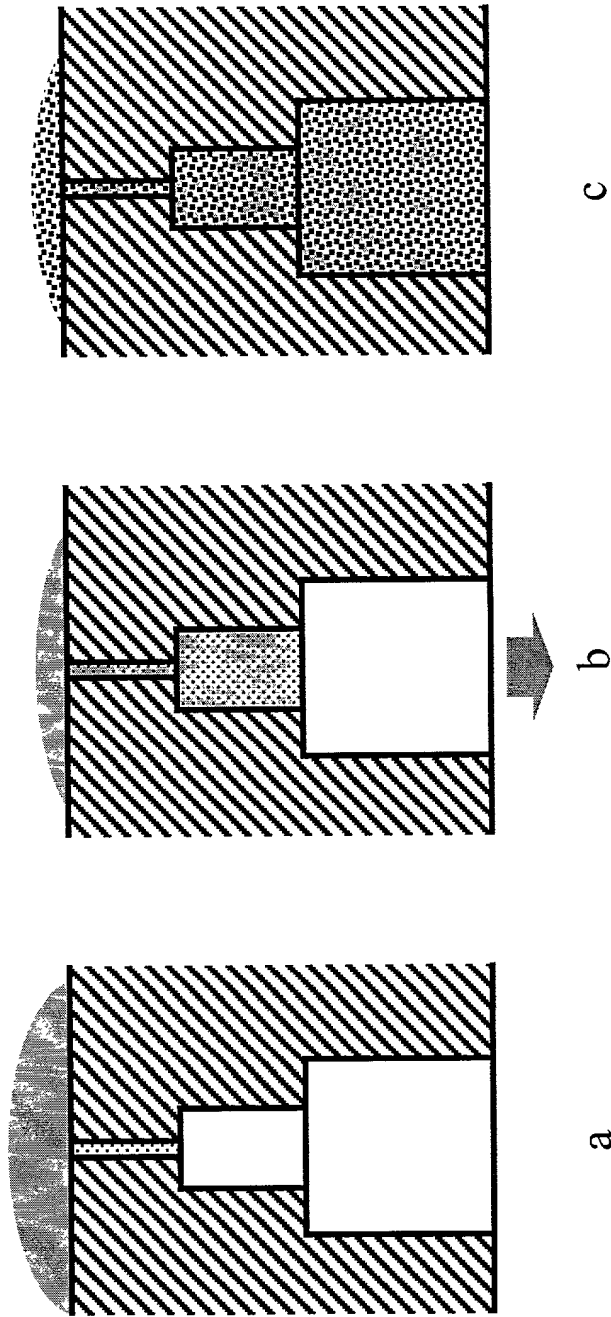
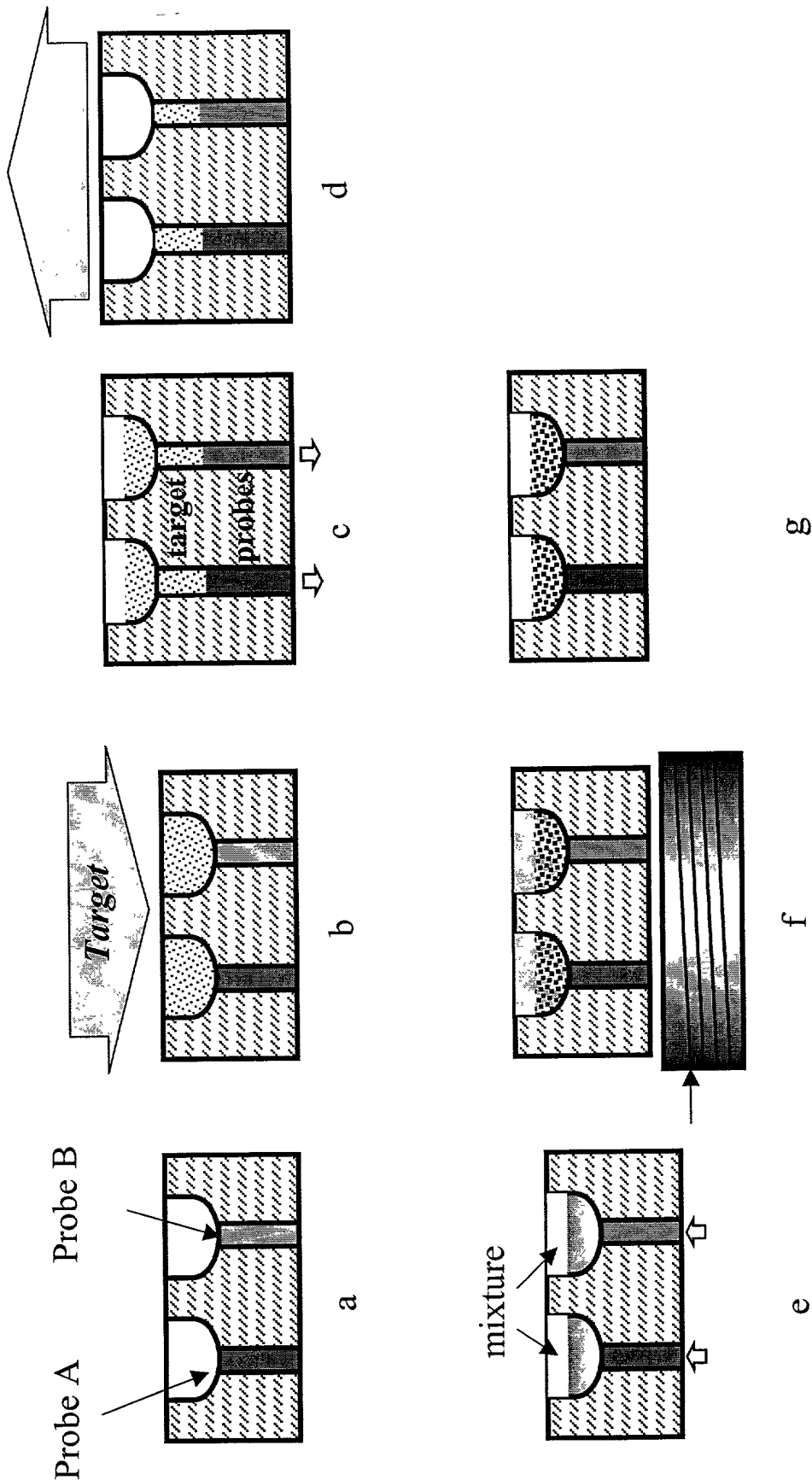


Fig. 32 Heterogeneous Assay

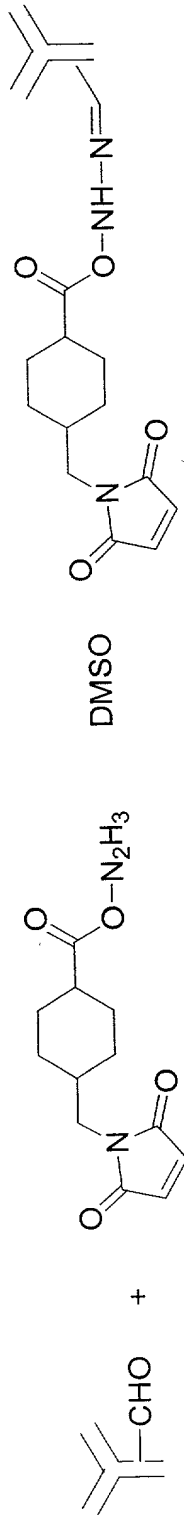


# Antibody Immobilization via the Carbohydrate Moiety

1. Oxidation of antibodies vicinal diol group to its aldehyde



2. Conjugation of maleimide moiety with antibody



3. Immobilization of the modified antibody to the surface.

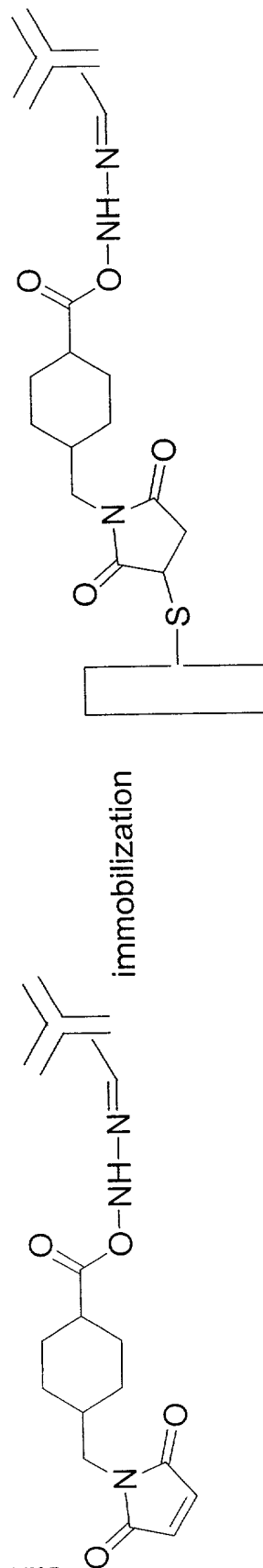
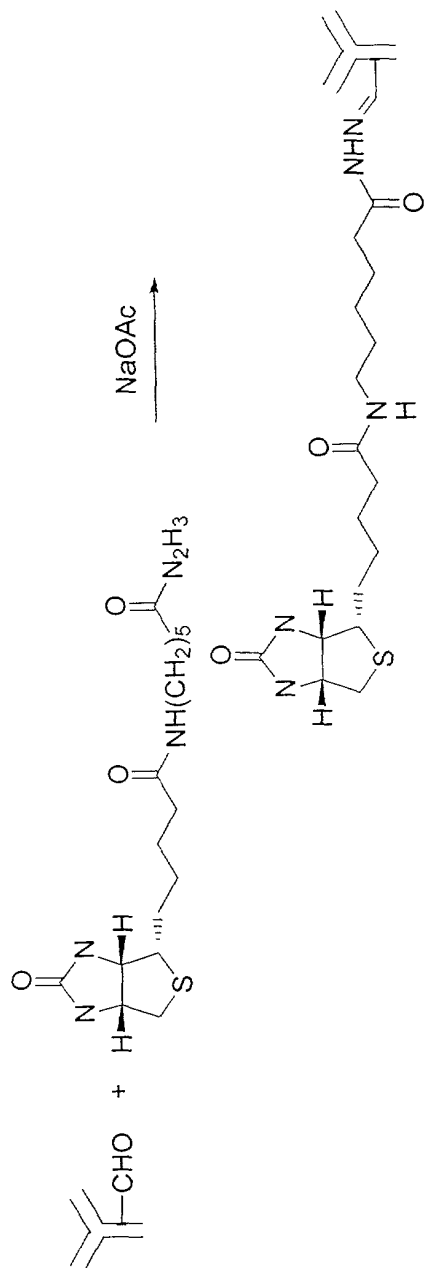


FIG. 33A



# Antibody Immobilization via Streptavidin

## 1. Label antibody with biotin



## 2. Modification of fiber surface with biotin maleimide

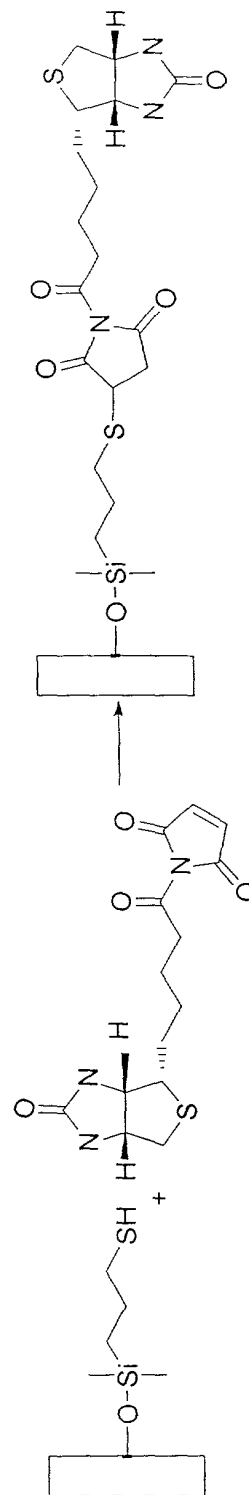
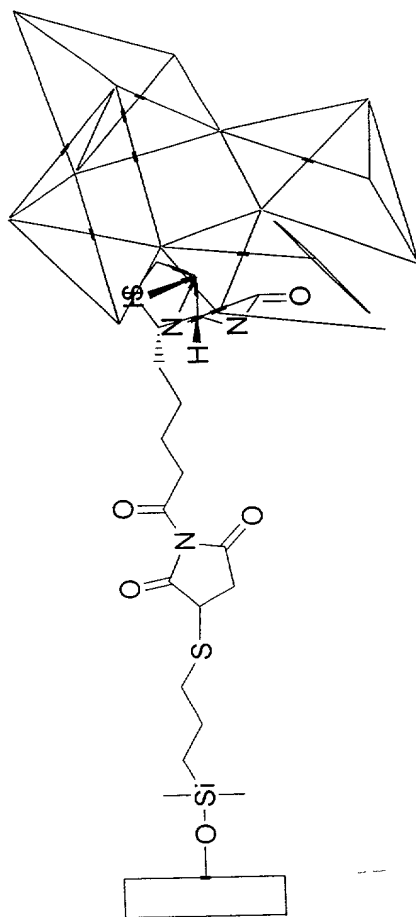


FIG 33c

# Antibody Immobilization via Streptavidin

3. Conjugate Streptavidin to the surface



4. Conjugate Biotin Antibody to the surface

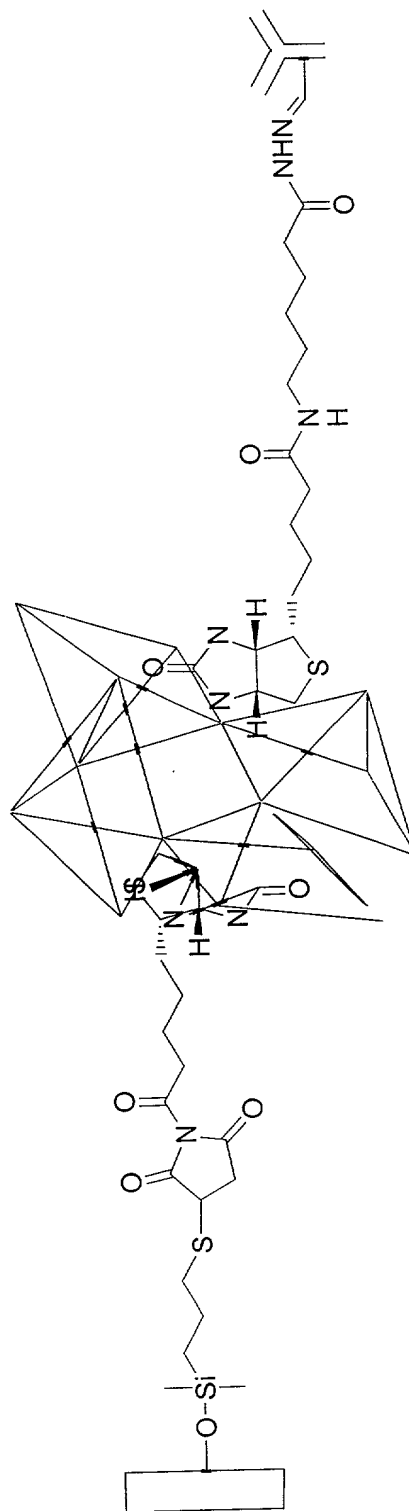
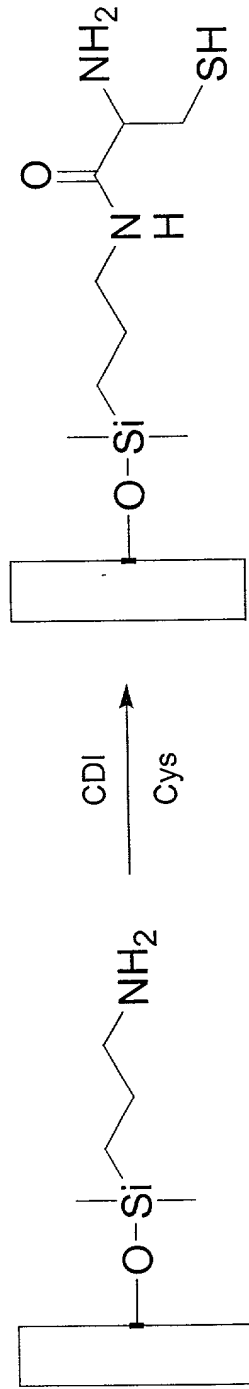


FIG. 33D



# Formation of thiazolidine

## 1. Surface attachment and formation of the linker



## 2. Thiazolidine formation

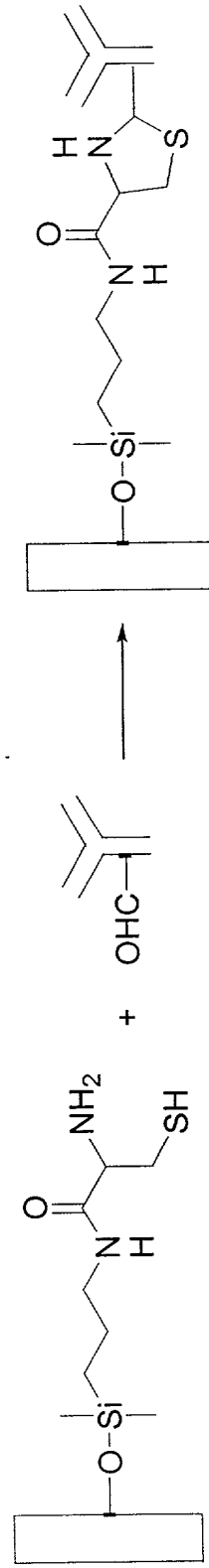
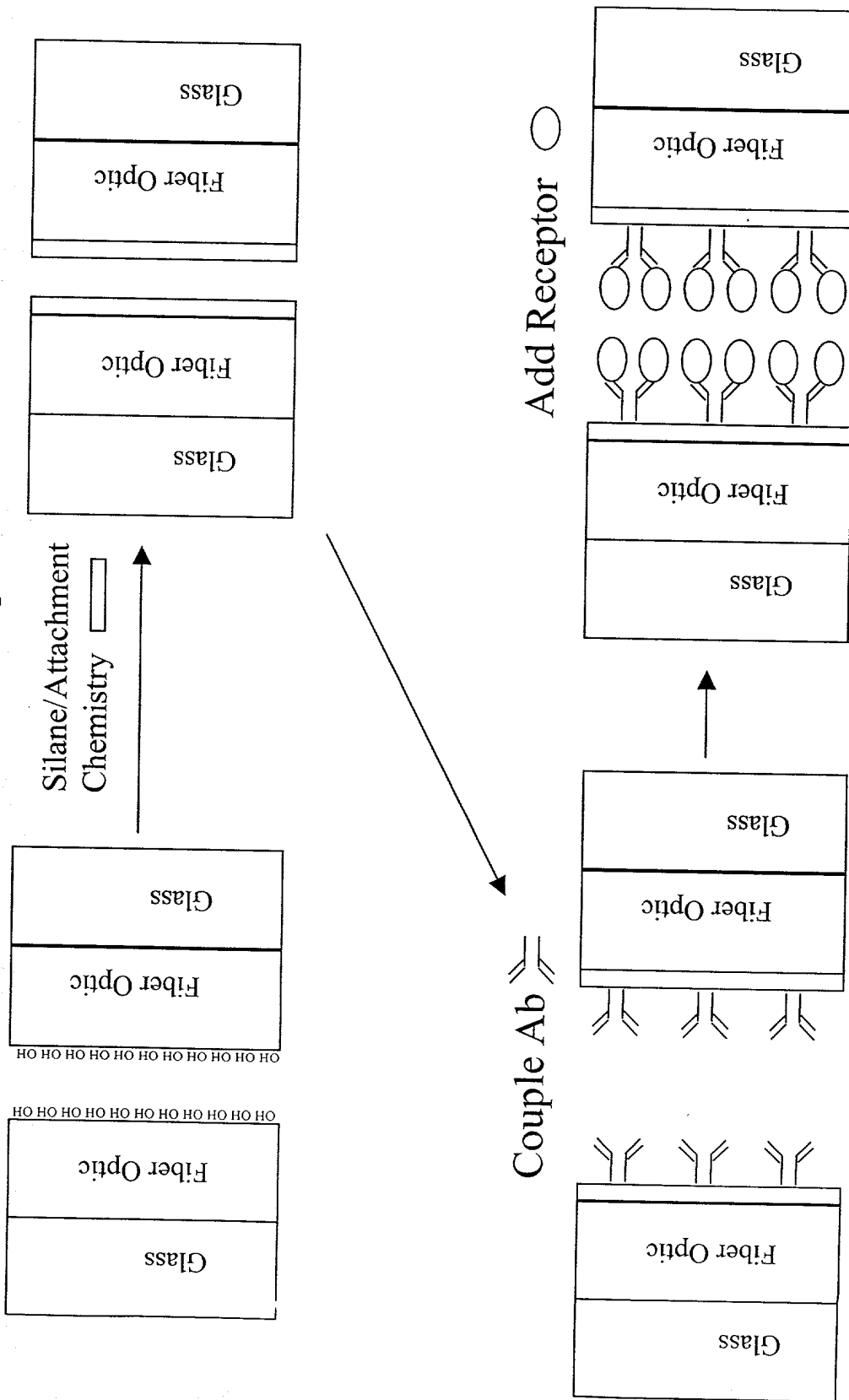


FIG. 33E

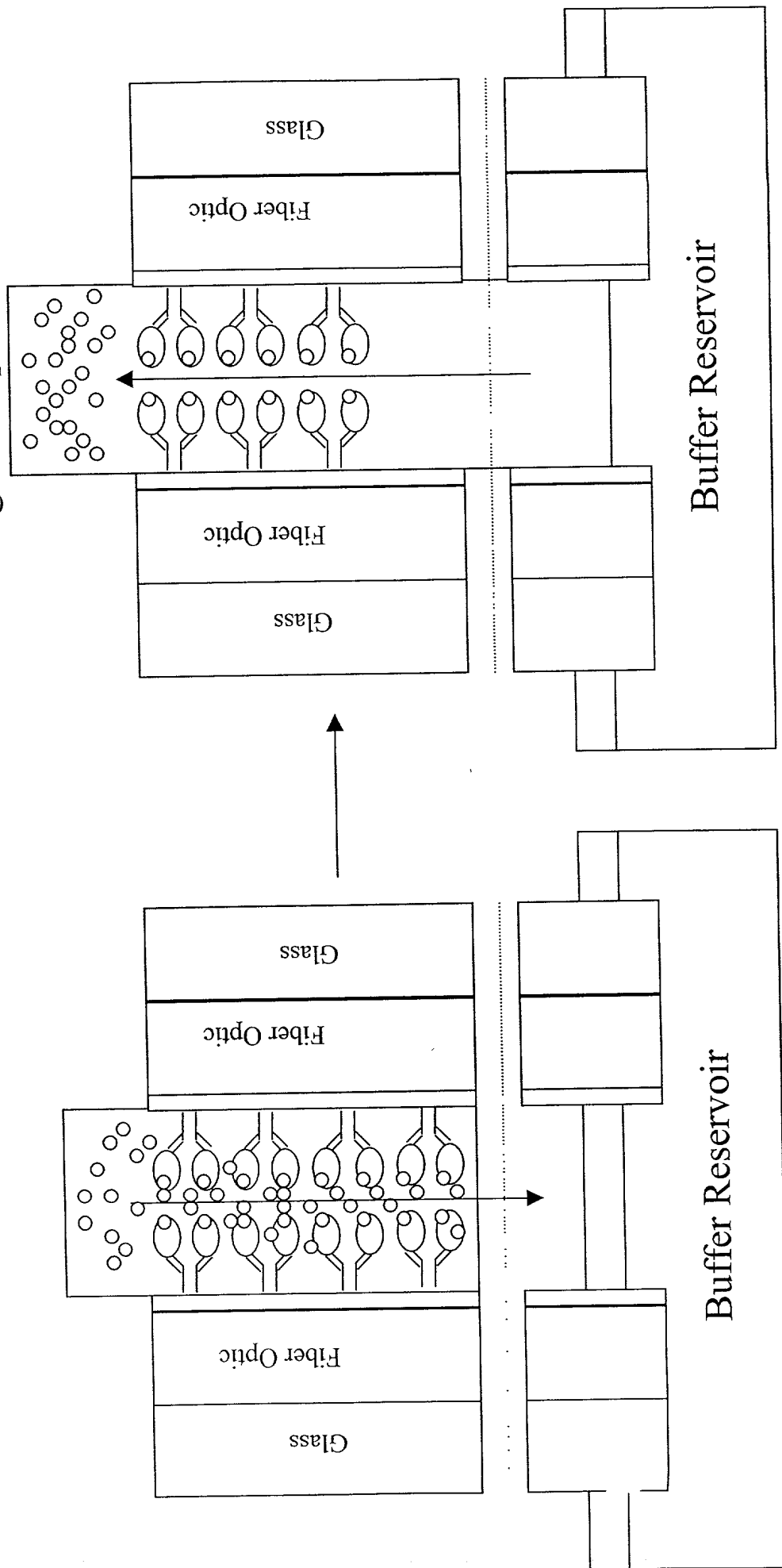
# Figure 34



# Figure 34 (cont. 1). Capillary Based Receptor Binding Assay: Non-equilibrium

Wash unbound ligand  
and calculate total bound  
using fiber optic base detection

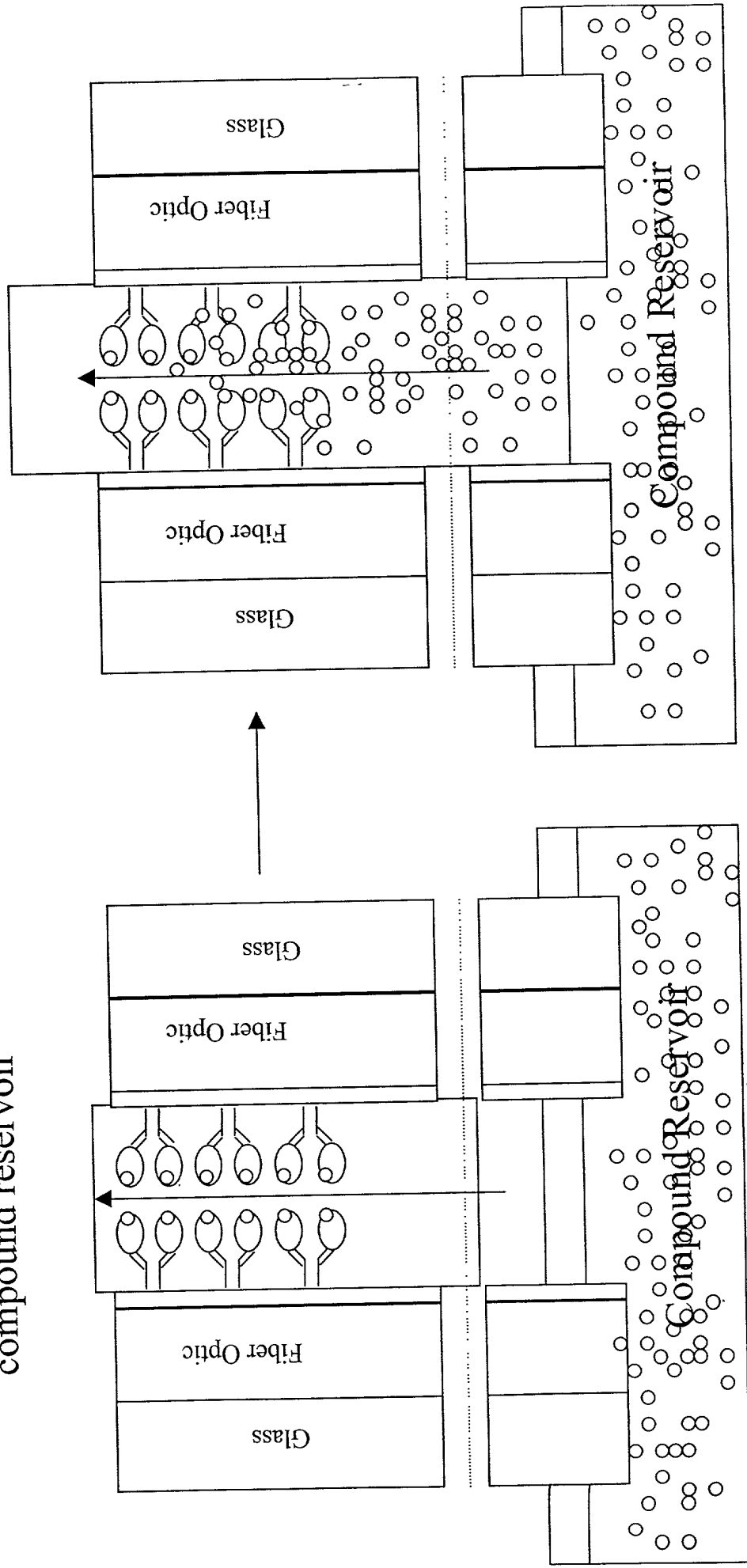
Add saturating ligand



# Figure 34 (cont. 2). Capillary Based Receptor Binding Assay: Non-equilibrium

Add compound and use fiber optic based detection to observe kinetics

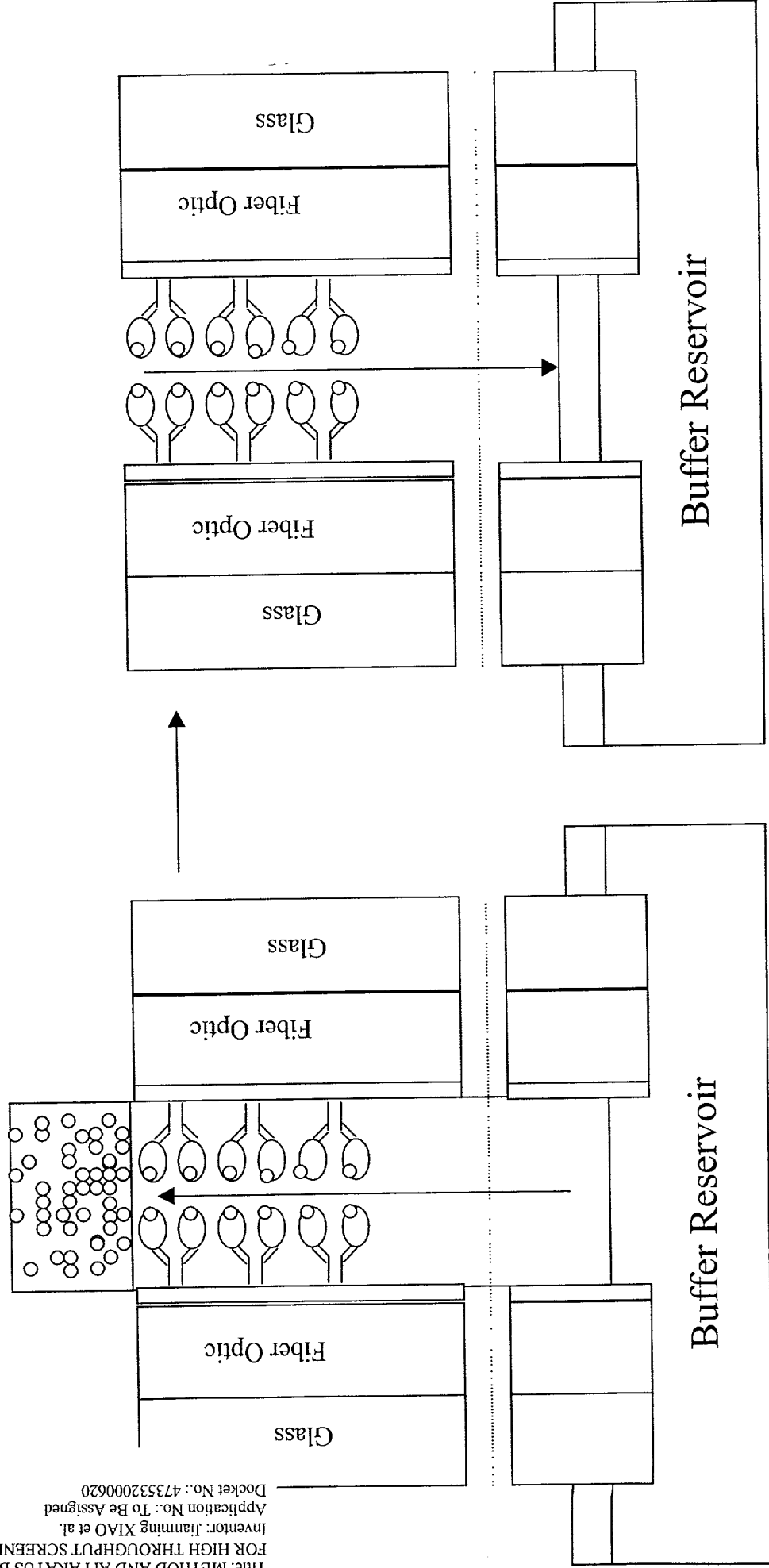
Move capillary to compound reservoir



# Figure 34 (cont. 3). Capillary Based Receptor Binding Assay: Non-equilibrium

Mover capillary to buffer reservoir and wash

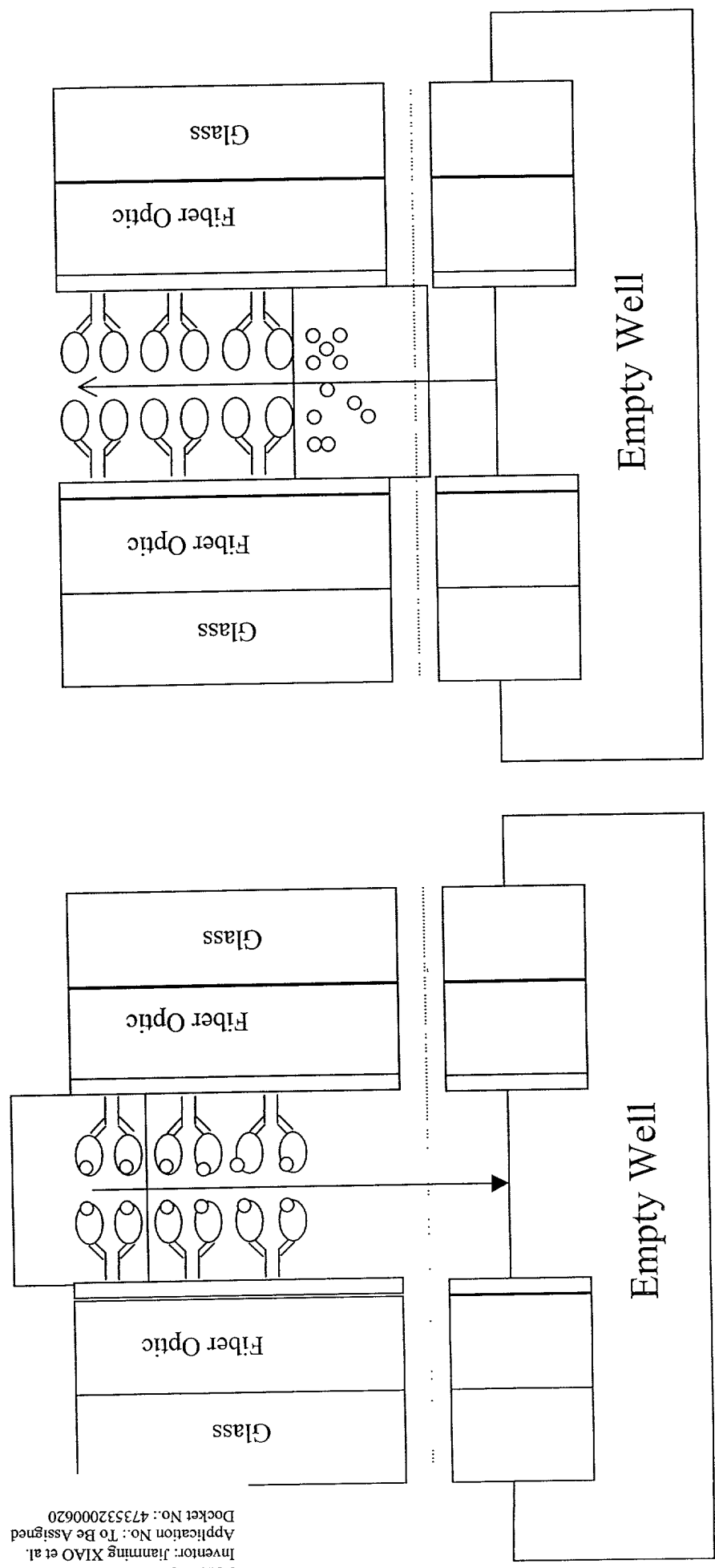
Dry capillary



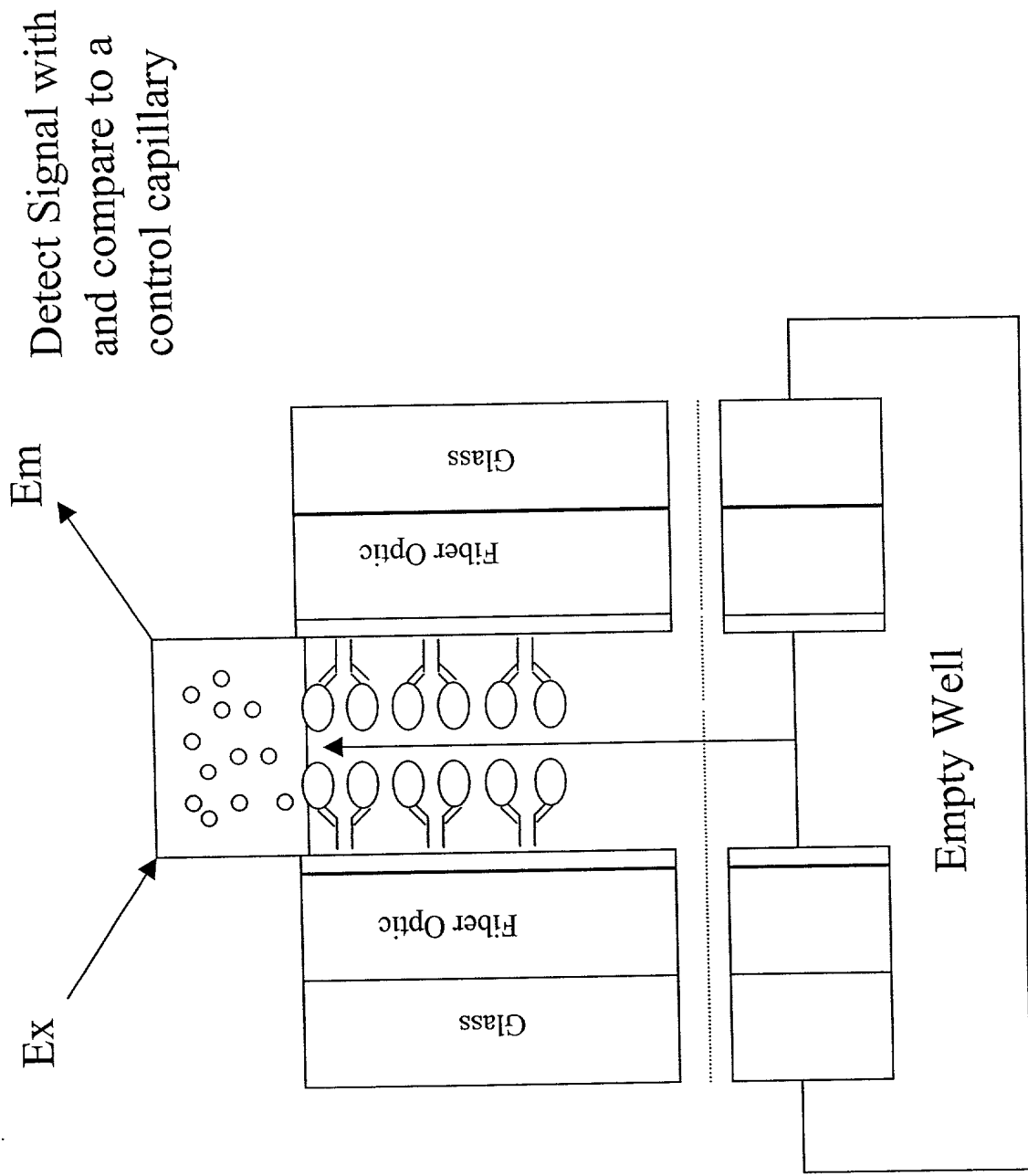
**Figure 34 (cont. 4). Capillary Based Receptor Binding Assay: Non-equilibrium**

Push an acid plug or detect  
% bound using fiber optic  
based detection

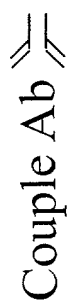
Apply vacuum  
after plug travels  
down capillary



**Figure 34 (cont. 5). Capillary Based Receptor Binding Assay: non-equilibrium**



53

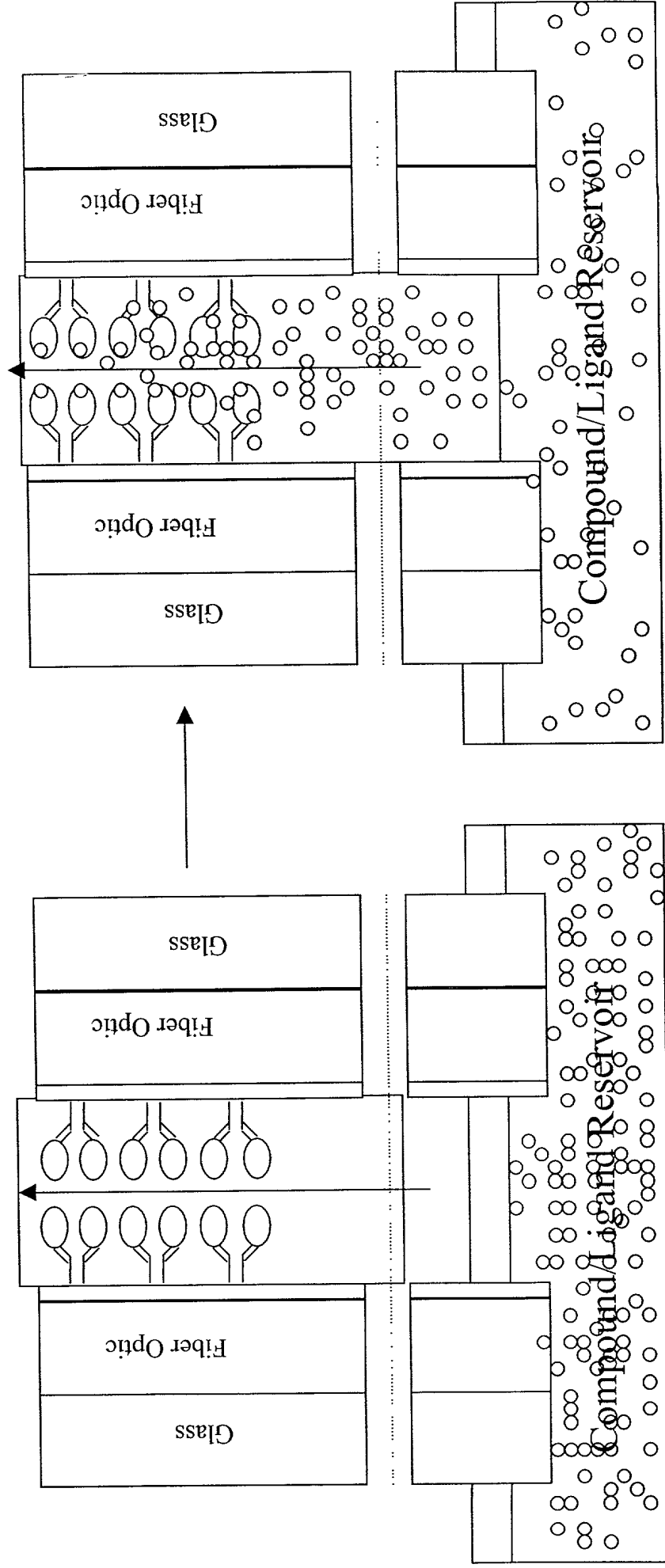




# Figure 35 (cont. 1). Capillary Based Receptor Binding Assay: Equilibrium

Move Capillary to compound/ligand reservoir.

Add solution and let system reach equilibrium. Detect equilibrium using fiber optic base detection.



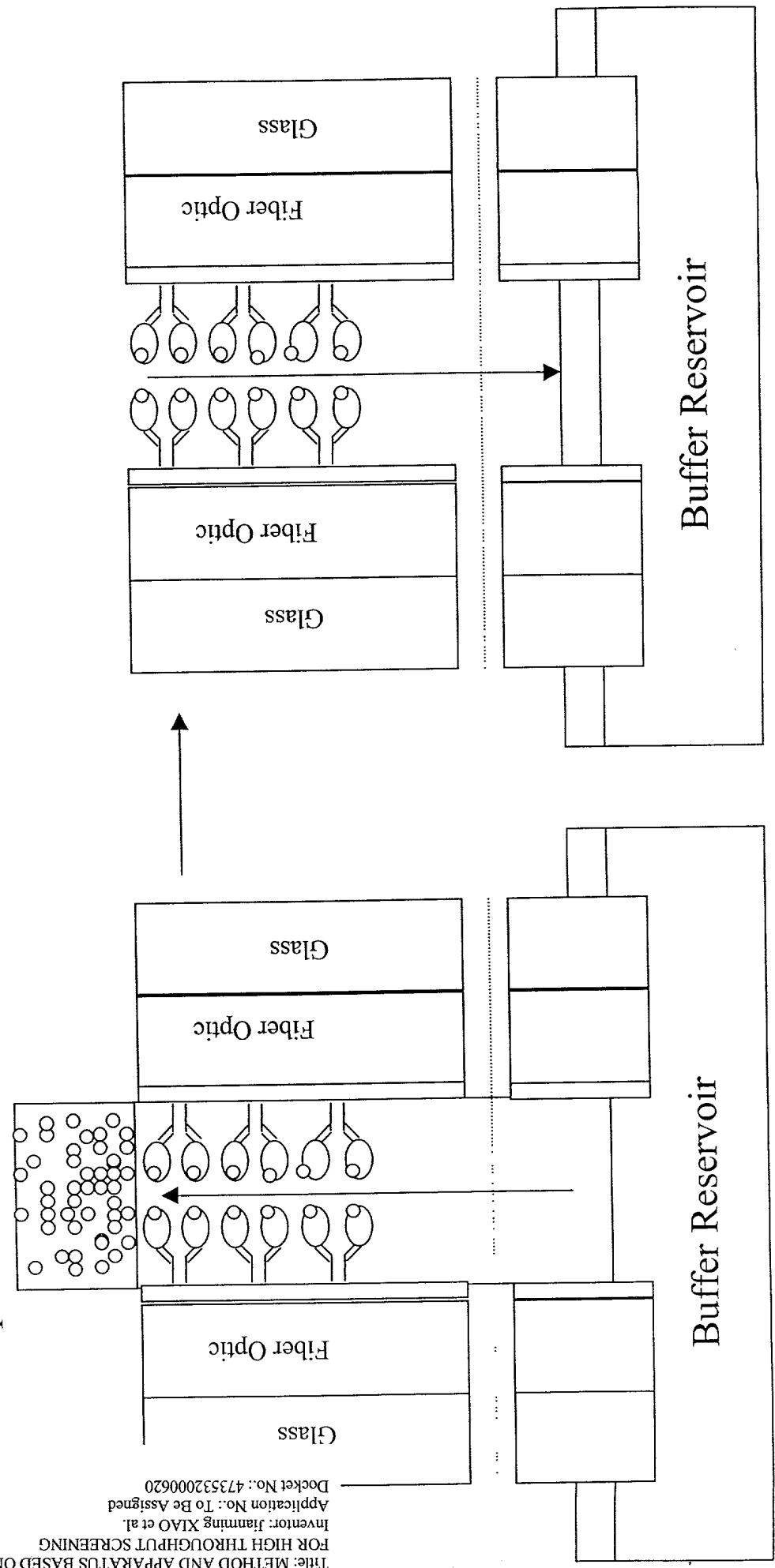
**Figure 35 (cont . 2). Capillary Based Receptor Binding Assay: Equilibrium**

Title: METHOD AND APPARATUS BASED ON BUNDLED CAPILLARIES  
 FOR HIGH THROUGHPUT SCREENING  
 Inventor: Jianming XIAO et al.  
 Application No.: To Be Assigned  
 Docket No.: 473532000620

Sheet 50 of 58

Move capillary to a buffer reservoir and wash capillary with buffer. Detect % bound using fiber optic based detection.

Dry Capillary



**Figure 35 (cont . 3). Capillary Based Receptor Binding Assay: Equilibrium**

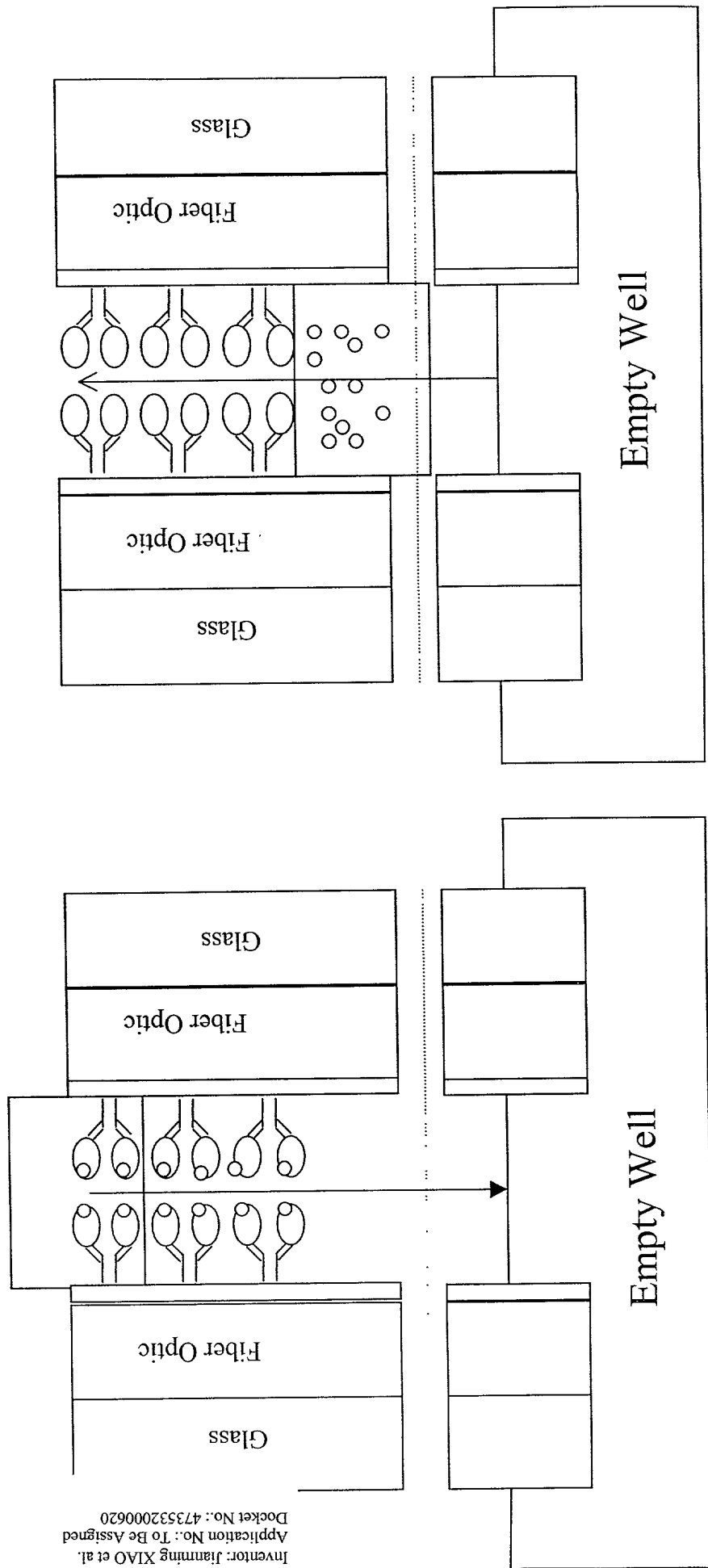
Title: METHOD AND APPARATUS BASED ON BUNDLED CAPILLARIES

Inventor: Jianming XIAO et al.  
Application No.: To Be Assigned  
Docket No.: 4735332000620

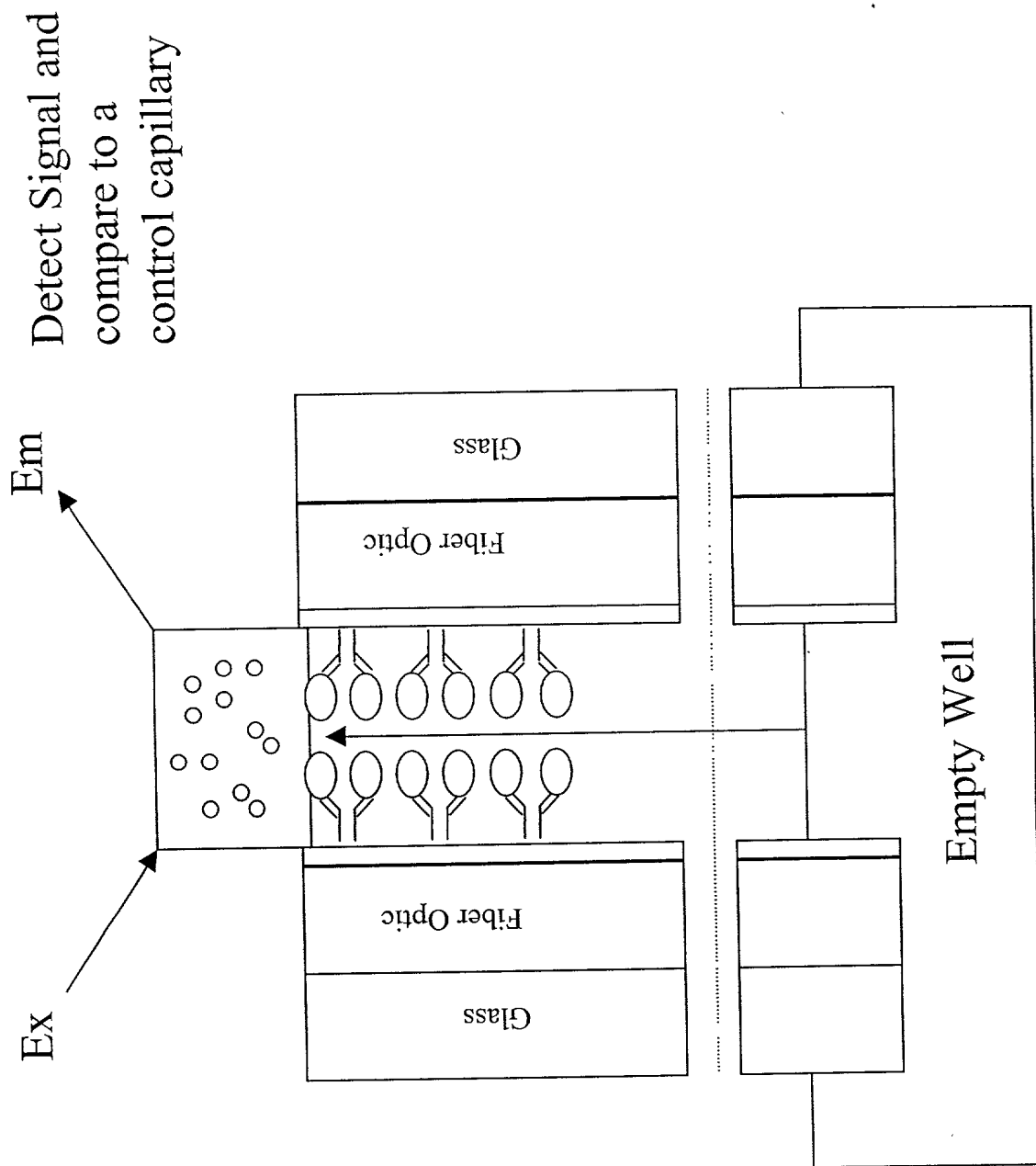
Sheet 51 of 58

Detect signal using fiber optic  
base detection or elute bound  
ligand with acid.

Apply vacuum  
after pug travels  
down capillary



**Figure 35 (cont. 4). Capillary Based Receptor Binding Assay: Equilibrium**



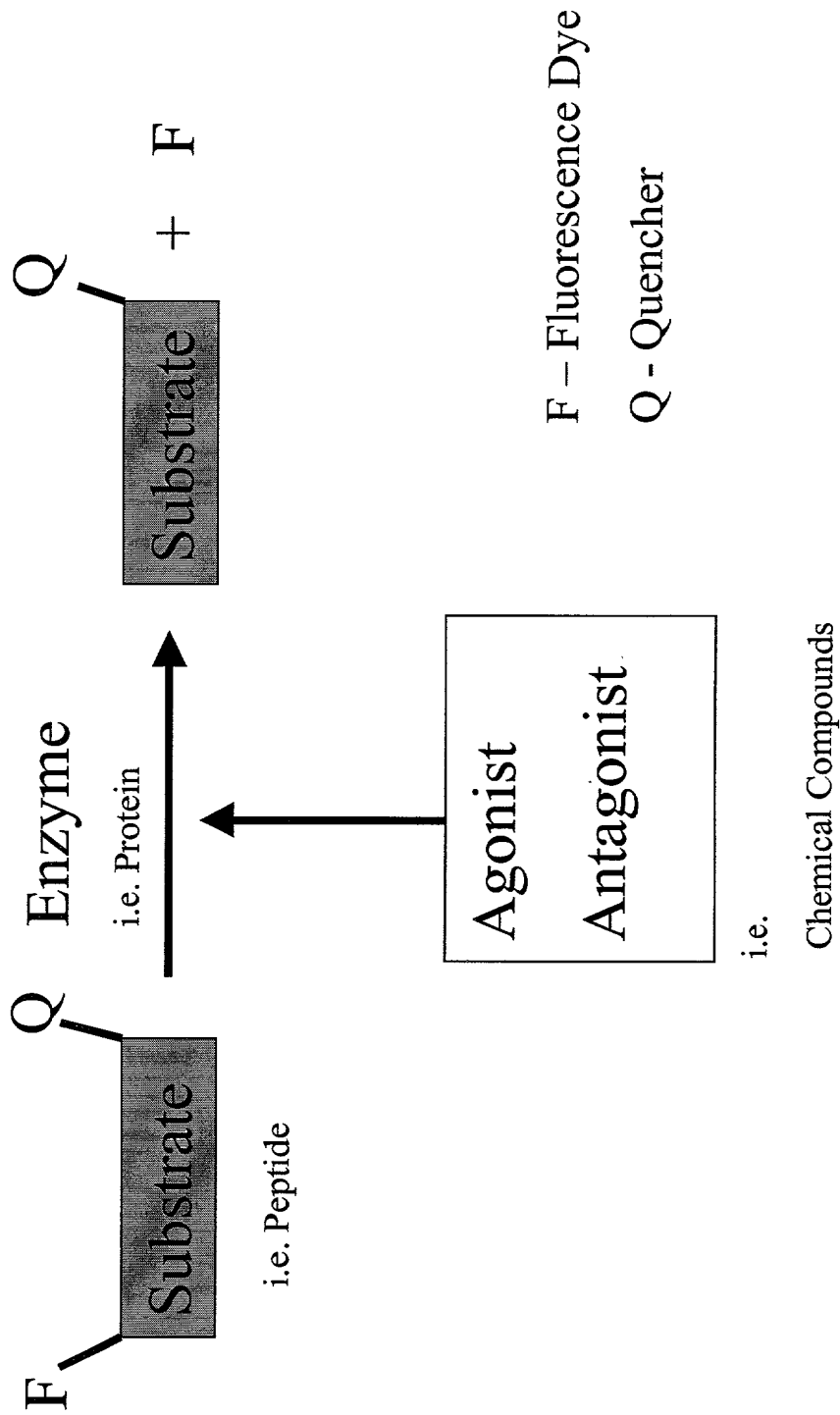
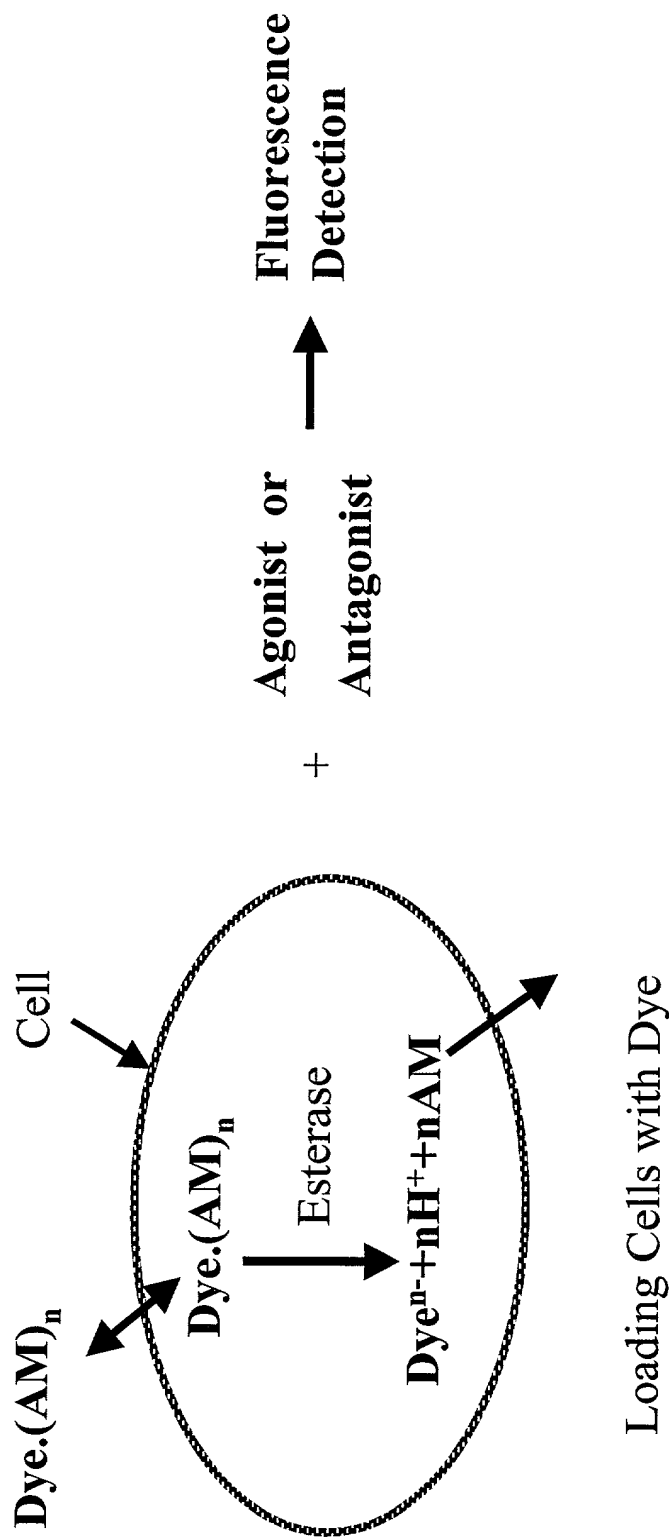


Figure 36

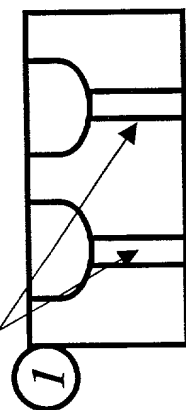


Assay Based on Tracking Cytosolic [Ca<sup>++</sup>]

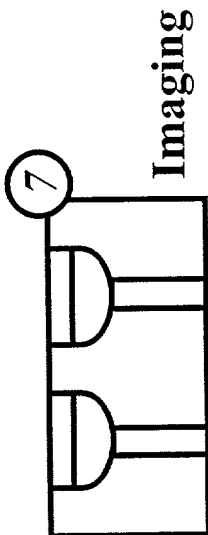
Figure 37

# Protein Array & Cell Array

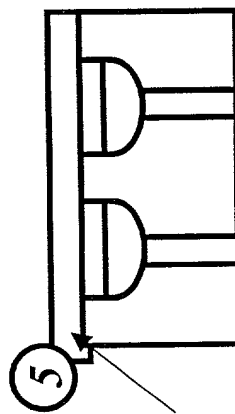
Library of antigen or antibody  
Attached to magnetic beads



*Aspiration  
from top*



## Mixing circle



## Binding interaction

## De-magnetize

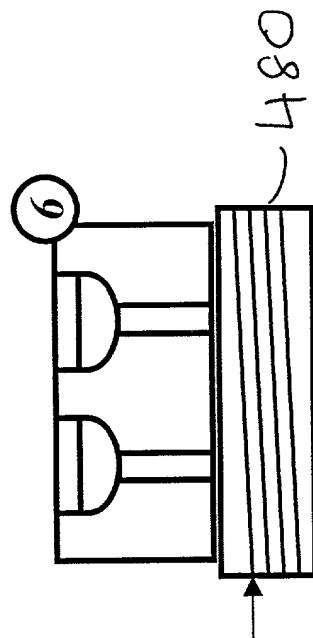


FIG. 38A

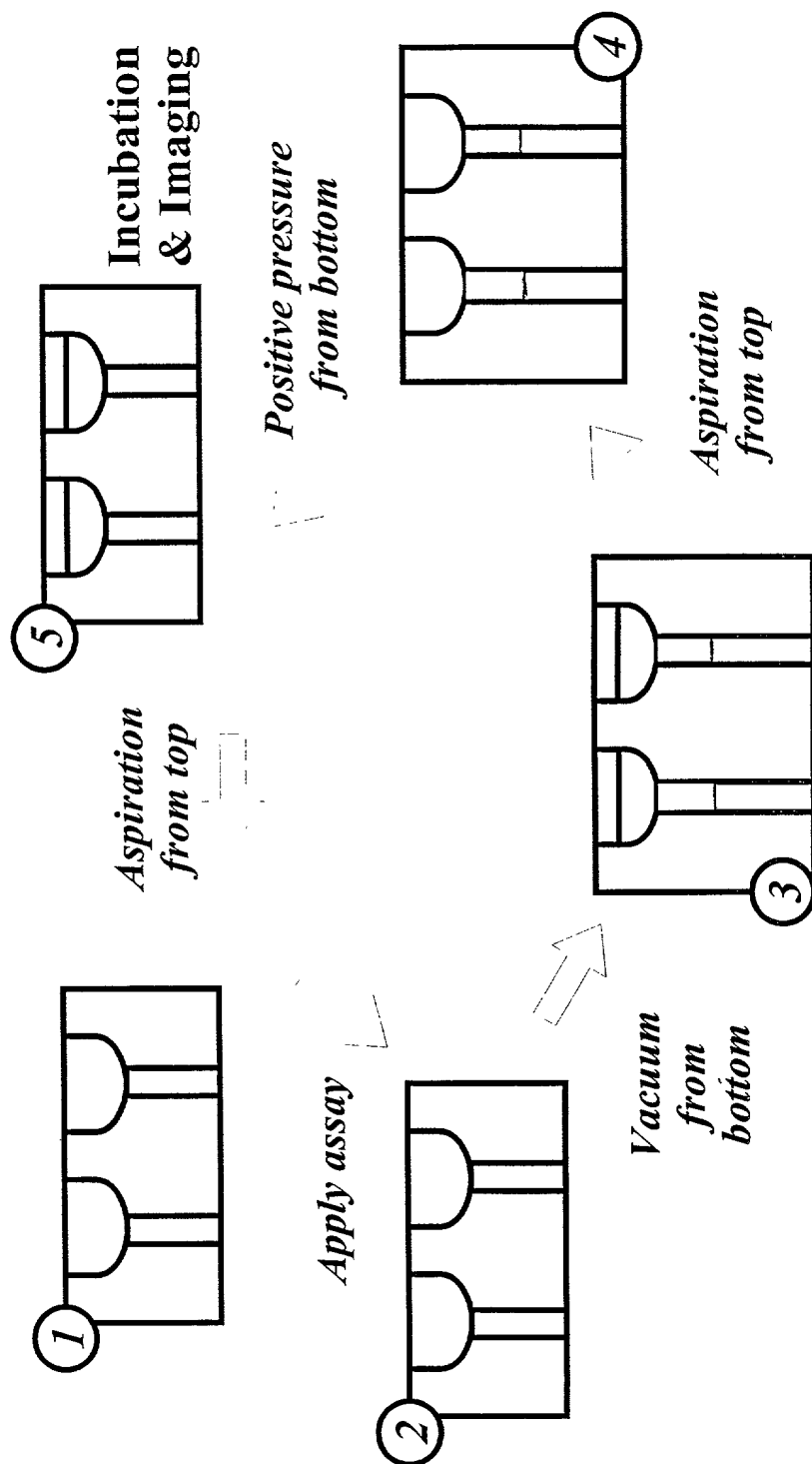


Fig. 333B



Fig. 39 One embodiment of the capillary array cartridge design

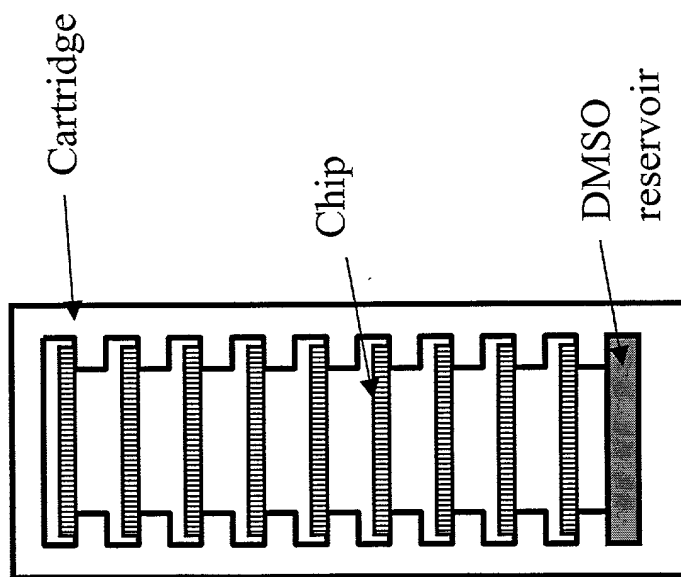
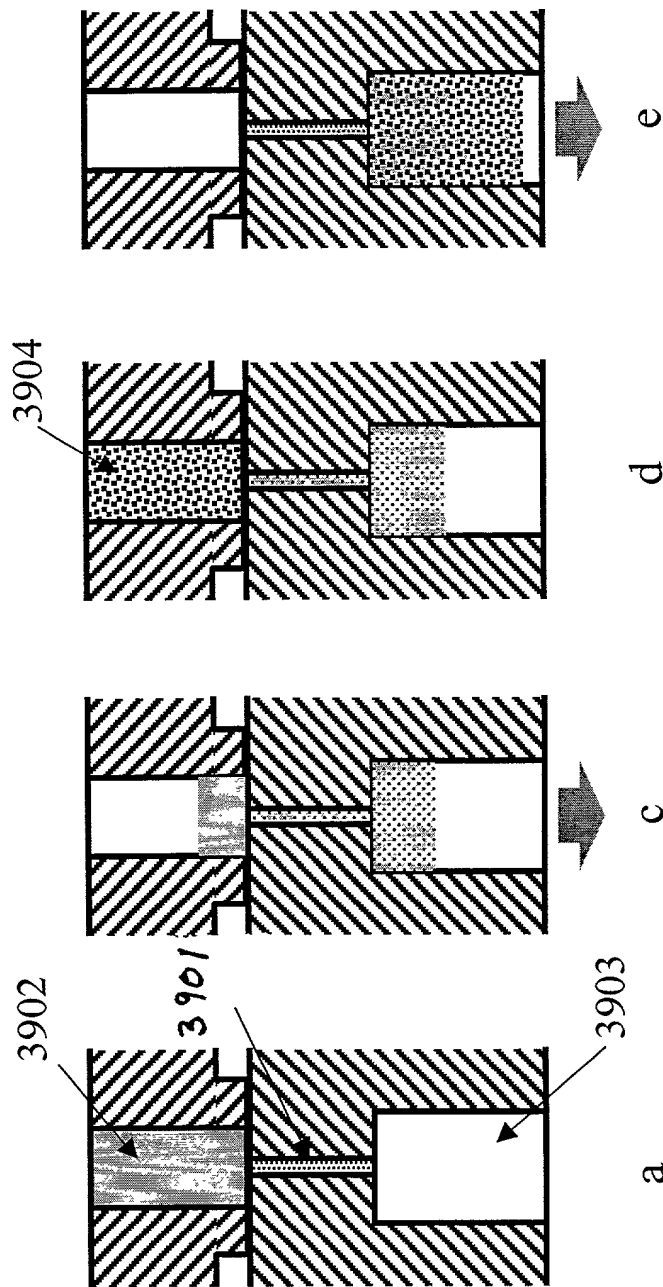


Fig. 40 Metering with through hole plates and mixing



- 3901 – compound and compound storage chamber
- 3902 – reagent A (i.e. enzyme) in through hole plate A
- 3903 – mixing/reaction chamber
- 3904 – reagent B (i.e. substrate) in through hole plate B